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TEST REPORT

ADAPTIVE ANTENNA CONTROL (AAC) PROGRAM

SEPTEMBER 1980

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This is the test report for the Adaptive Antenna Control Program (Contract No. DAAB07-76-C-8085). The program is under the management of the U.S. Army Communications Systems Agency, and monitored by the U.S. Army Communications R&D Command both of Ft. Monmouth, New Jersey. SIGNATRON, Inc. and RF Systems, Inc. (as antenna sub-contractor) had the responsibility for executing the program tasks. This report summarizes these tasks and includes the results of the factory and field test phases.

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The Predetection Combiner (PDC) developed under this effort accepts one to four 70 MHz input diversity signals and provides a combined signal output at three delay values shifted 1/2 QPSK symbol length from each other. These three combined diversity signals are inputs to the MD-918 modem tapped-delay line in the Adaptive Forward Dqualizer. The purpose of the factory tests was to evaluate the PDC operation and its interface with the MD-918 troposcatter modem. Some of the specific measurement objectives of the test program included:

Measurement of the PDC combining performance with no diversity inputs to the MD-918 modem. The PDC performance for up to four diversity inputs was compared with the MD-918 performance. No substantial differences resulted.

Measurement of PDC operation in conjunction with MD-918 diversity combining. Joint operation was compared with MD-918 and PDC operation alone. No substantial differences resulted.

Calibration of the PDC Correlation Coefficient Analyzer.

A field test of the concept of angle diversity as implemented with a vertical splay of beams spaced approximately one beamwidth apart.

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SECTION 1
TEST REPORT

1.0 Introduction

This is the test report for the Adaptive Antenna Control Program (Contract No. DAAB07-76-C-8085). The program is under the management of the U.S. Army Communications Systems Command, and monitored by the U.S. Army Communications R&D Command, both of Fort Monmouth, New Jersey. SIGNATRON, Inc. and RF Systems, Inc. (as antenna subcontractor) had the responsibility for executing the program tasks. This report summarizes these tasks and includes the results of the factory and field test phases.

1.1 Background

The Defense Communications Agency (DCA) and the military departments are upgrading the troposcatter links in the Defense Communications System (DCS). Current attention is focused on DCS links in Europe. NATO is also contemplating an upgrade of the troposcatter links in its ACE-High system. Current planning for DCS troposcatter links calls for all digital traffic to meet the criteria set forth in the Defense Communications Engineering Center's Technical Report No. 12-76, "DCS Digital Transmission System Performance". The upgrade effort is complicated by a need to reduce frequency assignments and conserve spectrum bandwidth.

In response to DCA tasking for a solution to the problem, the Depart. of Army sponsored an investigation which chose angle diversity as a promising technique to combat snort term fading and alleviate aperture-to-medium coupling loss without expanding current usage of the frequency spectrum. The effort consisted of three phases: the study phase, the equipment development phase, and the link test and data evaluation phase.

1.1.1 Study Phase

The study phase involved the specification of the system parameters, the development of various mathematical models, and prediction of angle diversity performance on various links. Documents describing the study phase are Interim Technical Report [1.1], Second Interim Technical Report [1.2], and Final Report [1.3].

1.1.2 Equipment Development Phase

The equipment developed for tne field test phase consist of:

1. Two C-band angle diversity feedhorns.
2. A Pre-Detection Combiner (PDC) to augment one of two MD-918 modems allowing up to 8 diversity operation.

The feedhorns were developed, factory and field tested by RF Systems, Inc. The final report prepared by RF Systems describes the feedhorns and gives the results of those tests. It can be found in Appendix A.

The Pre-Detection Combiner was developed by SIGNATRON, Inc. In order to interface with the PDC, one of the MD-918 modems [1.4] (S/N 008) was modified. The PDC also contains a

correlation coefficient analyzer for measuring the envelope process correlation coefficient between any two diversities. The PDC, the modifications to the MD-918, and the operation of the correlation coefficient analyzer are discussed in the Pre-detection Combiner Operating and Maintenance Manual [1.5].

Factory tests were made to establish the performance of the PDC/MD-918 combination. These tests are described in Section 2.

1.1.3 Link Test Phase

Field testing of the feedhorns was done by RF Systems in July 1977. Field testing by SIGNATRON including channel and bit error rate measurement covered the period from September 1977 to May 1978. The testing was done on the RADC C-band troposcatter link. The link, the test set-up, and the field tests are described in Section 3.

In addition to the field tests from September 1977 to May 1978, resident test site personnel took channel data intermittently from November 1978 to October 1979.

1.2 Reliability Analysis

A reliability analysis for the Pre-Detection Combiner is included as Appendix J.

REFERENCES

[1.1] P. Monsen, S. Parl, J. N. Pierce, "Adaptive Antenna Control", Interim Technical Report, ECOM Contract DAAB07-76-C-8085, Dec. 22, 1976. (A.D. # A044 416)

[1.2] P. Monsen, S. Parl, "Adaptive Antenna Control", Second Interim Technical Report, ECOM Contract DAAB07-76-C-8085, Feb., 1978. (A.D. # A055 820)

[1.3] P. Monsen, "Adaptive Antenna Control", Final Report, ECOM Contract DAAB07-76-C8085, March, 1980.

[1.4] D. R. Kern, P. Monsen, et al., "Megabit Digital Troposcatter Subsystem (MDTS)", Research and Development Technical Report, ECOM Contract DAAB07-74-C-0040, April, 1977.

[1.5] "Predetection Combiner Model 212A Operating and Maintenance Manual", Report #CSA-76-8085-6, ECOM Contract DAAB07-76-C-8085, May, 1979.

SECTION 2
PREDETECTION COMBINER - FACTORY TESTS

2.0 Introduction

The Predetection Combiner (PDC) accepts one to four 70 MHz input diversity signals and provides a combined signal output at three delay values shifted 1/2 QPSK symbol length from each other. These three combined diversity signals are inputs to the MD-918 modem tapped-delay line in the Adaptive Forward Equalizer. The purpose of the factory tests was to evaluate the PDC operation and its interface with the MD-918 troposcatter modem. Some of the specific measurement objectives of the test program included:

- Measurement of the PDC combining performance with no diversity inputs to the MD-918 modem. The PDC performance for up to four diversity inputs was compared with MD-918 performance. No substantial differences resulted.
- Measurement of PDC operation in conjunction with MD-918 diversity combining. Joint operation was compared with MD-918 and PDC operation alone. No substantial differences resulted.
- Calibration of the PDC Correlation Coefficient Analyzer.

2.1 Bit Error Rate Testing

Performance tests included measurement of bit error rate on a non-fading channel and measurement of average bit error rate on both flat fading and multipath spread fading channels. The non-fading tests were performed for each diversity vs. the abscissa value of bit energy per noise spectral density, E_b/N_o. This quantity is also expressable as

$$\frac{E_b}{N_o} = \frac{P_{AV}}{N_o R}$$

which represents the ratio of average signal power P_{AV} to the noise power in the bit rate (R) bandwidth. Figure 2.1 shows the ideal non-fading performance, viz.,

$$p = \frac{1}{2} \operatorname{erfc} \sqrt{E_b/N_o} \quad ,$$

and the typical MD-918 non-fading performance. The set-up for all the bit error rate tests is shown in Figure 2.2. The tropo simulator was a SIGNATRON S-139C, which generates four independent diversity channels. This limited testing to four orders of diversity or less.

The type and sequence of tests is outlined in Table 2.1. The sequence of tests shown in Table 2.1 was first performed at 12.6 Mb/s; the data rate was then changed to 6.3 Mb/s, and the test sequence repeated. The selected value of rms Doppler spread for the tests was 5 Hz since this choice reduces

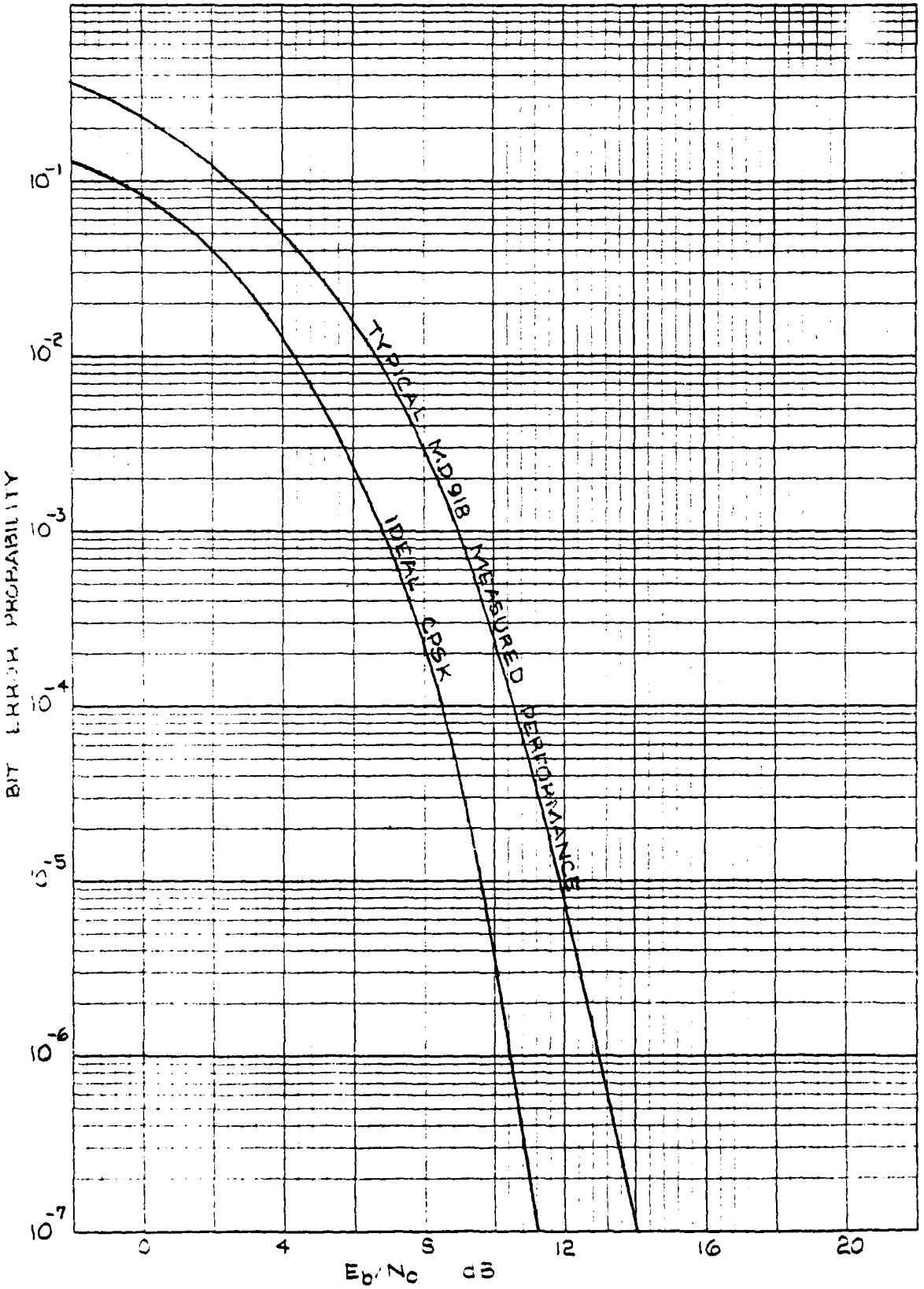


Fig. 2.1 Non Fading Performance

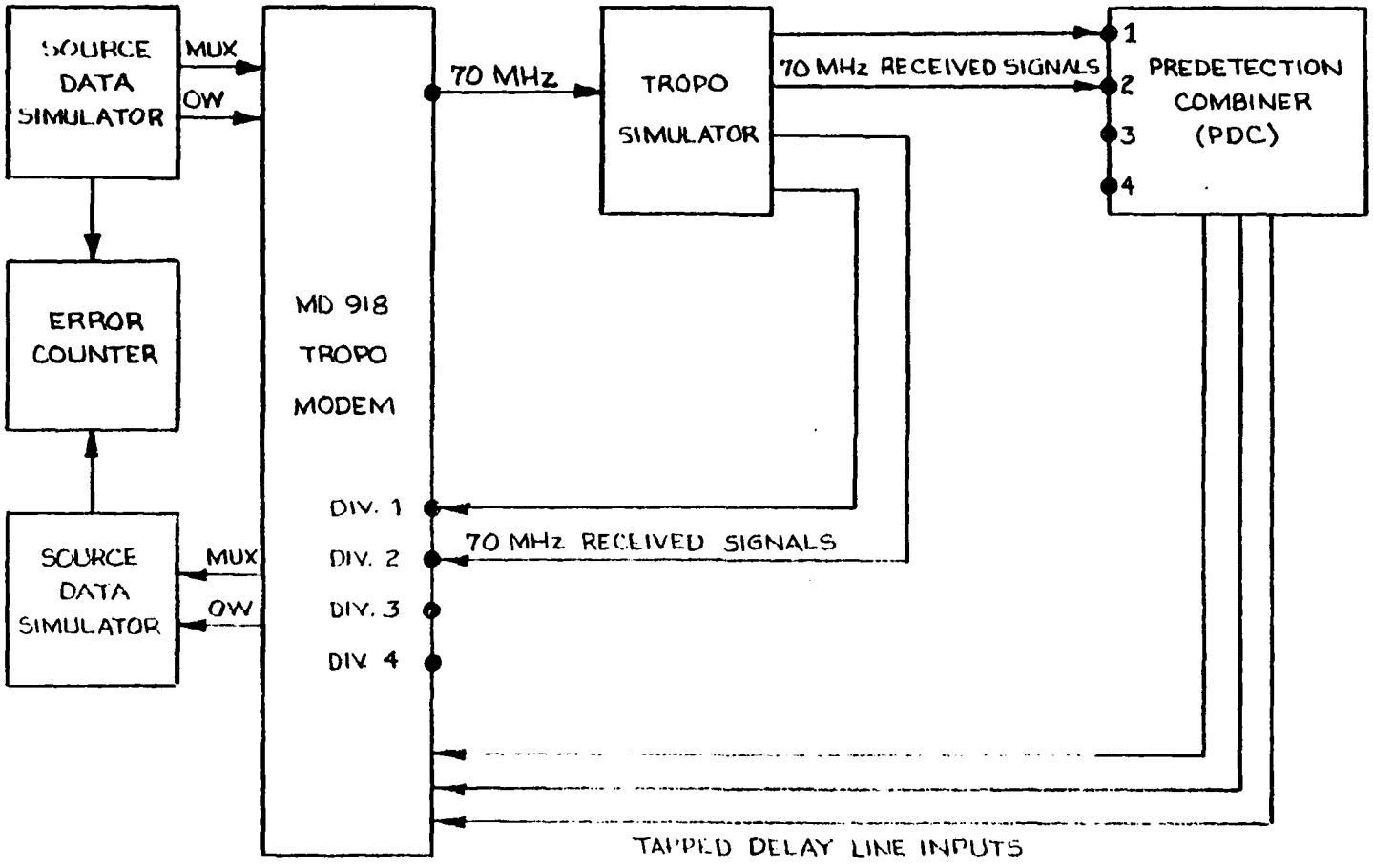


Fig. 2.2 Factory Test Set-Up

TABLE 2.1

SUMMARY OF FACTORY B.E.R. TESTS

6.3, 12.6 Mb/s

EQUIPMENT CONFIGURATION	CHANNEL			
	NON-FADING	FLAT FADING	RADC C-BAND LINK	SAHIN TEPESI YAMANLAR L-BAND LINK
PDC 1	NO DIVERSITY			
2	"			
3	"			
4	"			
MD918 1 (1)	"			
2 (1)	"			
3 (1)	"			
4 (1)	"			
MD918 1 (2)	"			
2 (2)	"			
3 (2)	"			
4 (2)	"			
MD918 1&2		2S	2S	
1&2		1S/1A	1S/1A	
PDC 1&2		1S/1A	1S/1A	
1&3		"	"	
1&4		"	"	
2&3		"	"	
3&4		"	"	
MD918 1,2,3,4		2S/2F	2S/2F	2S/2F
1,2,3,4		2S/2A	2S/2A	2S/2A
PDC 1,2,3,4		2S/2A	"	"
MD918 3,4/PDC 1,4		2S/2A	2S/2A	2S/2A

1. PDC CONNECTED
2. PDC DIS-CONNECTED

measurement time and is also consistent with maximum expected rms Doppler values for the C-band RADC link. Spot checks of fading performance at 1 Hz were used to verify the absence of any speed dependencies. All fading tests were initiated using the simulator reset button to provide repeatable measurements and to allow system comparisons.

Typical data sheets for non-fading, flat fading, C-Band fading and L-Band fading form Figures 2.3, 2.4, 2.5 and 2.6, respectively. A typical plot of performance is shown in Figure 2.7. The abscissa value, average bit energy divided by noise spectral density for all beams, is equal to the average signal power for all beams divided by the noise power in the bit rate bandwidth.

Two path models were selected for the multipath fading tests at 6.3 and 12.6 Mb/s. A natural first choice was the C-band test link at RADC upon which the field tests were to take place. A DCS L-band link was selected for the other path model. The characteristics of these links are summarized in Table 2.2 and Table 2.3.

The multipath profiles for both the main and elevated beams, the squint loss of the elevated beam, and the normalized correlation coefficient between beams have been calculated for these path models. Because the troposcatter simulator utilizes independent diversity channels, simulation of the angle diversity configurations approximated the actual situation by using independent diversities but with an increased squint loss to account for the correlation. The asymptotic (large signal-to-noise ratio and flat fading) loss due to correlation

DATE Sept. 2, 1977

DATA RATE 6.276 Mbs

TEST: NON-FADING, PDC 1 /

$S/N_{max.} = -15 + 131 - 68 = 48$ db

S/N	ATTENUATOR SETTING	# ERRORS IN INTERVAL	INTERVAL	BIT ERROR RATE
0	48	$1,63 \times 10^{6}$	1 sec	$2,60 \times 10^{-1}$
3	45	911×10^{3}	1 sec	$1,45 \times 10^{-1}$
6	42	223×10^{3}	1 sec	$3,55 \times 10^{-2}$
9	39	$25,5 \times 10^{3}$	1 sec	$4,06 \times 10^{-3}$
12	36	$10,4 \times 10^{3}$	10 sec	$1,66 \times 10^{-4}$
15	33	1624	2 min	$2,16 \times 10^{-6}$

Fig. 2.3 Typical Non-Fading Data Sheet

DATE Sept. 2, 1976

DATA RATE 6.276 Mb/s
Doppler Spread 5 Hz

TEST: FLAT FADING, 4 DIV., MD-918 /
(2S/2F)

$S/N_{max} = -15 + 131 - 68 = 48$

S/N	ATTEN. SETTING A	B	C	D	* ERRORS IN INTERVAL	INTERVAL	BIT ERROR RATE
4	44	44	44	44	11.4×10^{6}	4 min.	7.57×10^{-3}
8	40	40	40	40	2.36×10^{6}	10 min.	6.27×10^{-4}
12	36	36	36	36	218×10^{3}	20 min.	3.56×10^{-5}
16	32	32	32	32	11.5×10^{3}	20 min.	1.53×10^{-6}
	Flat	Flat	Flat	Flat			

Fig. 2.4 Typical Flat Fading Data Sheet

DH

DATE Sept. 3, 1977

DATA RATE 6.276 MB/S
Doppler Spread 5 Hz

TEST: FADING, 4 DIVERSITY (RADC C-BAND LINK) (25/2A), PDC

$S/N_{max} = -15 + 131 - 68 + 3.1 \simeq 51$ ← REF MAIN + ELEV.

$= 51 + 4.14 \simeq 55$
↑ Segm.

S/N	ATTEN SET. A	B	C	D	= ERRORS IN INTERVAL	INTERVAL	BIT ERROR RATE
4	47	47	51	51	41.2×10^6	4 min.	2.74×10^{-2}
8	43	43	47	47	5.87×10^6	10 min.	1.56×10^{-3}
12	39	39	43	43	347×10^3	20 min.	4.65×10^{-5}
16	35	35	39	39	5.11×10^3	20 min.	6.79×10^{-7}
	C-A	C-B	C-E	C-E			

Fig. 2.5 Typical C-Band Data Sheet

DATE Sept. 1, 1977

DATA RATE 12.552
Doppler Spread 5Hz

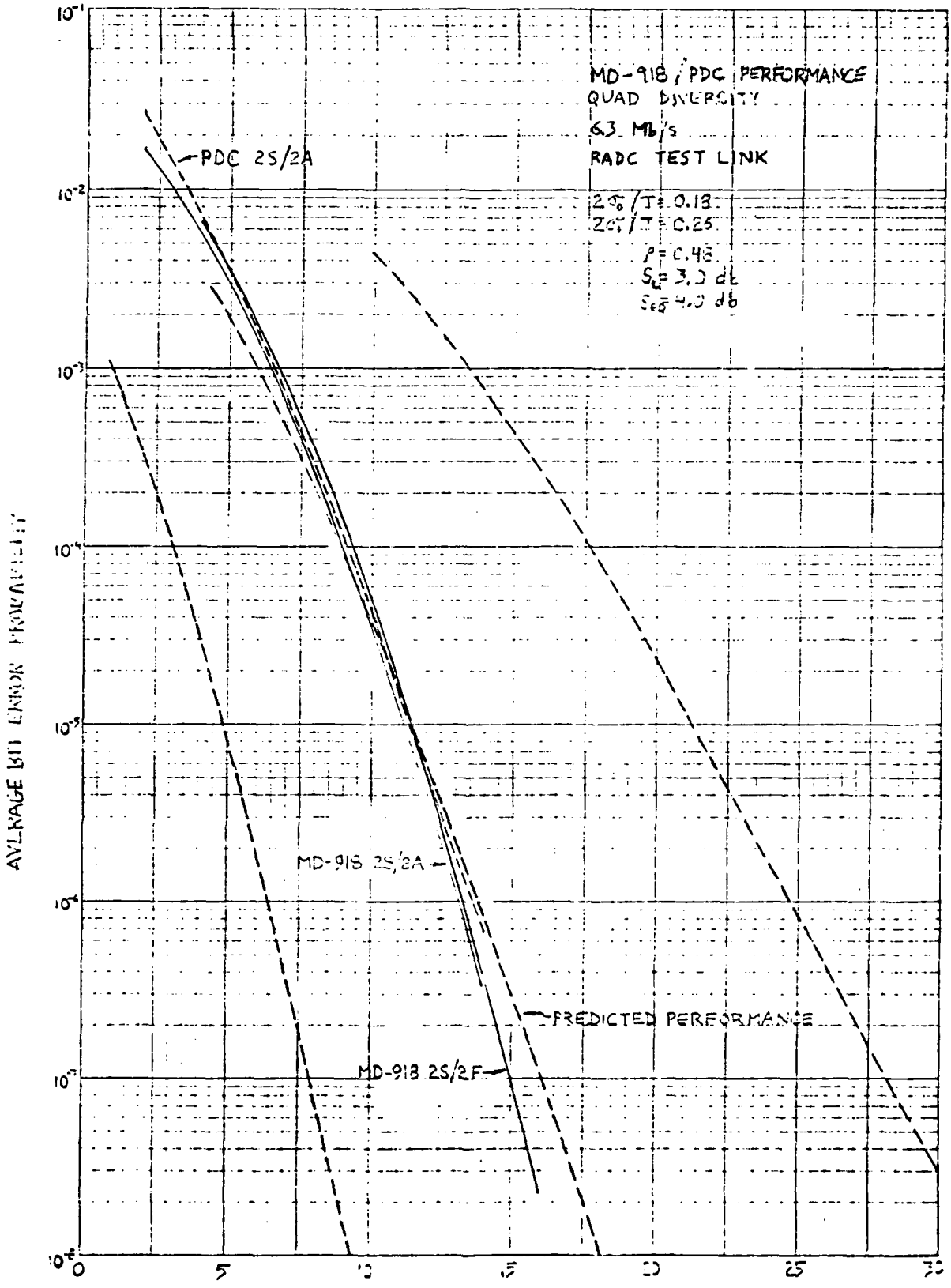
TEST: L-Band, (25/24), PDC

$S/N_{max} = -15 + 131 - 71 + 5.54 = 50.54 \simeq 51$ (MAIN)
↑ $PCF_{MAIN + ELEV.}$

$= 51 + 5.88 \simeq 57$ (ELEV.)
↑ Sequ.

S/N	ATTEN. SETTING A	B	C	D	# ERRORS IN INTERVAL	INTERVAL	BIT ERROR RATE
4	47	47	53	53	156×10^{6}	4 min.	5.12×10^{-2}
8	43	43	49	49	42.9×10^{6}	10 min.	$5.7 \times$
12	39	39	45	45	4.10×10^{6}	20 min.	$3.72 \times$
16	35	35	41	41	120.5×10^{3}	20 min.	$\times$
	L-M	L-M	L-E	L-E			

Fig. 2.6 Typical L-Band Data Sheet



MEAN DIVERSITY E_b/N_0 (dB)

Fig. 2.7 Typical Factory Test Plot

Table 2.2
PATH PARAMETERS

PATH	YOUNGSTOWN-VERONA N.Y.	SAHIN TEPESI-YAMANLAR
Length	168 s.m.	172 s.m.
Antennas	60' - 60'	60' - 60'
Frequency, GHz	4.4 to 5.0	0.75 to 0.98
3 dB Beamwidth	0.54^{o} - 0.54^{o}	1.3^{o} - 1.3^{o}
Station Elevation	320' - 440'	2893' - 3176'
Antenna Height	20'/20' - 20'/20'	70'/70' - 82'/82'
Take-off Angle*	0.28^{o} - 0.28^{o}	0° - $-.21^{o}$
Scatter Angle	1.8^{o}	1.7^{o}

*Estimated

Table 2.3

Multipath Profiles
Simulator Tap Attenuator Settings

(Tap Spacing = 66 Nanoseconds)

	C-Band RADC Link 168 s.m. 28' Ant.		L-Band Sahin Tepesi-Yamanlar 172 s.m. 60', 60" Ant.	
Atten. No.	Main Beam dB	Elev. Beam dB	Main Beam dB	Elev. Beam dB
1	∞	12	∞	12
2	2	1	∞	5
3	0	0	3	1
4	7	5	0	0
5	22	14	1	1
6	44	30	6	2
7			10	3
8			15	7
9			21	10
10			27	13
11			33	16
12			40	20
13			50	24
14			∞	29
15			∞	∞
16			∞	∞
2σ	58 ns	84 ns	133 ns	243 ns
S_L	3.0 dB		4.1 dB	
ρ	0.48		0.58	
PCF_{MAIN}	2.6 dB		4.2 dB	
$PCF_{MAIN + ELEV.}$	3.1 dB		5.5 dB	
S_{eq}	4.1 dB		5.9 dB	

between diversities is equivalent to an increase in the squint loss of $1 - \rho^2$ where ρ is the noarmalized correlation coefficient between beams. We defined the equivalent squint loss S_{eq} as the sum in dB of the squint loss S_L and tne correlation loss, i.e.,

$$S_{eq} = S_L - 10 \text{ LOG } (1-\rho^2).$$

In the simulation, S_{eq} was used as tne loss factor for the elevated beam diversities. This choice of squint loss to account for correlation between diversities is pessimistic at lower values of SNR but is adequate for purposes of evaluating PDC and MD-918 modem operation.

The 2σ values for the simulated profiles, correlation coefficients, and squint losses for these two path models are summarized in Table 2.3. The simulator attenuator settings given in Table 2.3 do not include the equivalent squint loss in the elevated beam. The power correction factor (PCF) is the additional multipath power which must be included in the computation of average bit energy E_b. We define the noise power at the simulator output measured in tne bit rate bandwidth as N_oR and the average signal power for one tap output with an attenuator setting of 0 dB as P_s. The mean SNR expressed as tne ratio of average bit energy to noise power in a 1 Hz bandwidth is equal to

$$\text{SNR} = 10 \text{ LOG } \left(\bar{E}_b/N_o\right) = 10 \text{ LOG } \left(P_s/N_oR\right) + \text{PCF}$$

where the power correction factor accounts for the additional power from other simulator taps. The simulator was calibrated and the noise power at the simulator was checked with a noise-bandwidth calibrated filter.

The predicted performance curves for the MD-918 modem/PDC combination for these two links and the two data rates 6.3 and 12.6 Mb/s are shown in Figures 2.8 through 2.11. The predicted performance includes the correlation effect. The use of S_{eq} to approximate the correlation effect is slightly pessimistic because it represents an asymptotic case. Thus, all other effects being equal, the measured results should be slightly poorer than the predicted results. However the effect of this pessimistic approximation is only a fraction of a dB, which is less than the prediction accuracy (a few dB) and the measurement accuracy ($\pm$ 1 dB).

Appendix B contains plots of the data taken for the various configurations of Table 2.1.

2.2 Correlation Coefficient Analyzer (CCA)

The test set-up for assessing the performance of the correlation coefficient analyzer of the PDC is shown in Figure 2.1.2. The diversity A output is split. One splitter output feeds CCA input port #1, the other feeds attenuator A. Diversity B is attenuated by 3 dB (to match the loss of the splitter), then feeds attenuator B. The attenuator outputs are summed to form the input to CCA port #2.

By controlling the A and B attenuators, the correlation between A and C (inputs 1 and 2) can be controlled. The calculated correlation coefficient (ρ_{calc}) is generated according to the formula appearing in the figure.

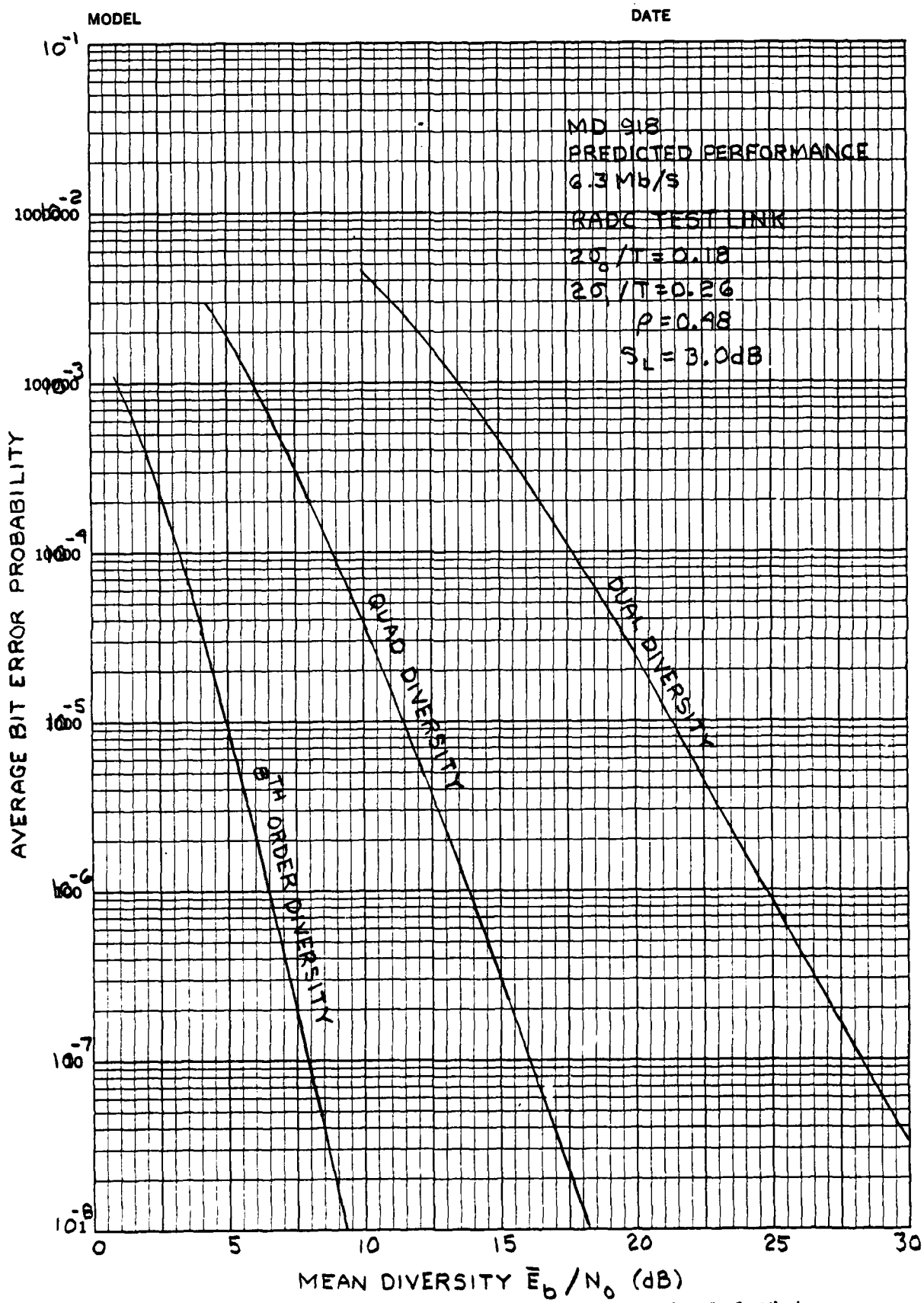


Fig. 2.8 Predicted Performance: C-Band, 6.3 Mb/s

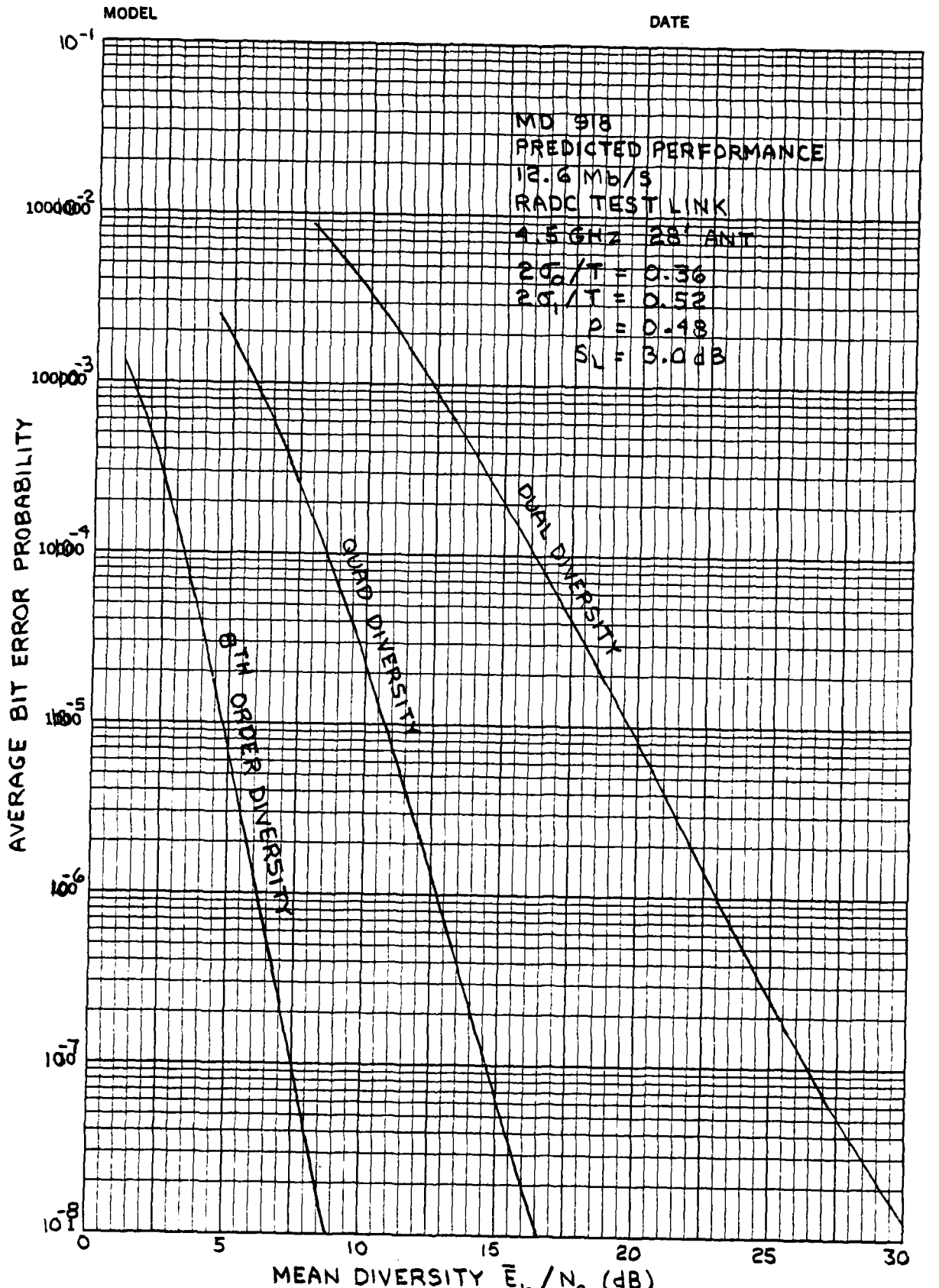
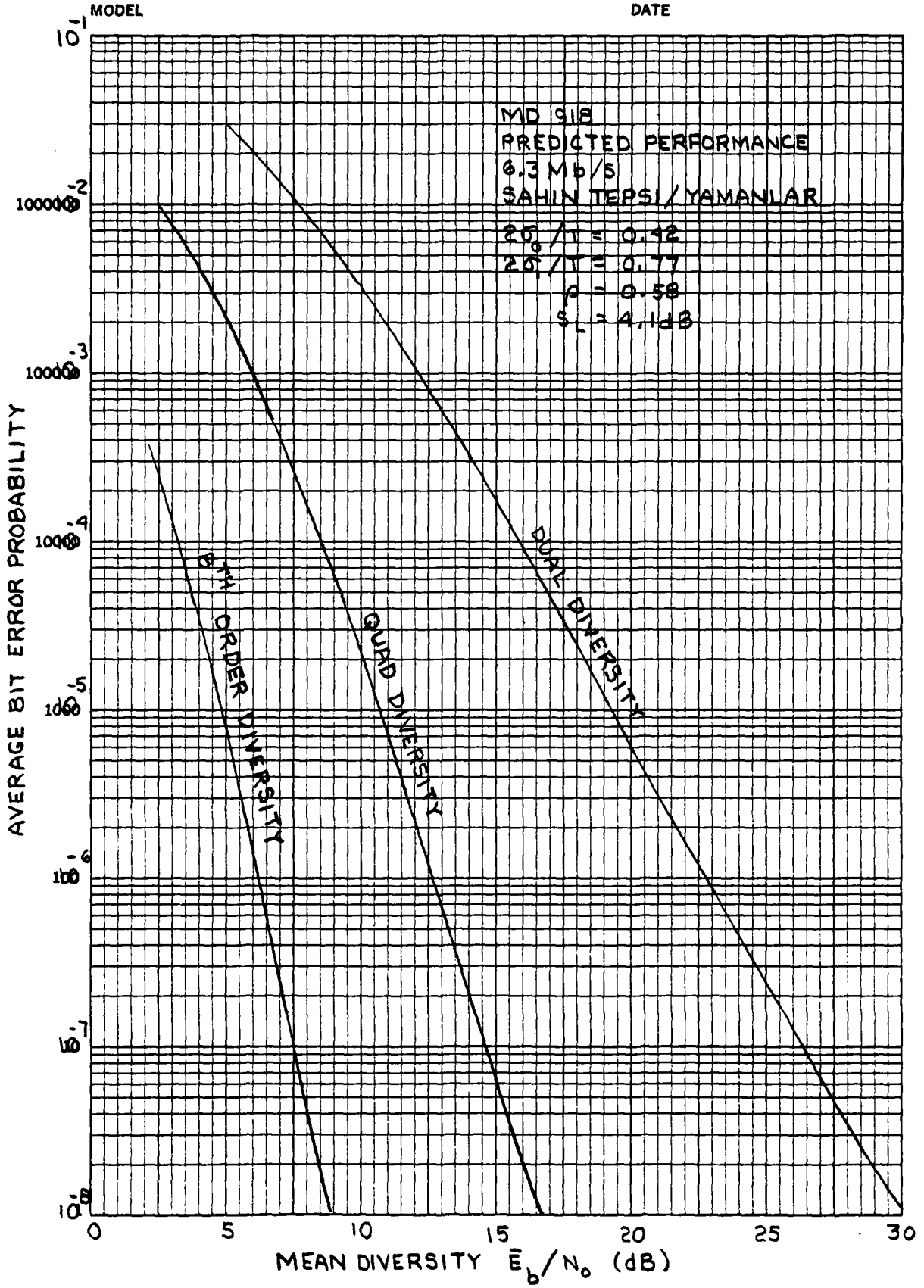


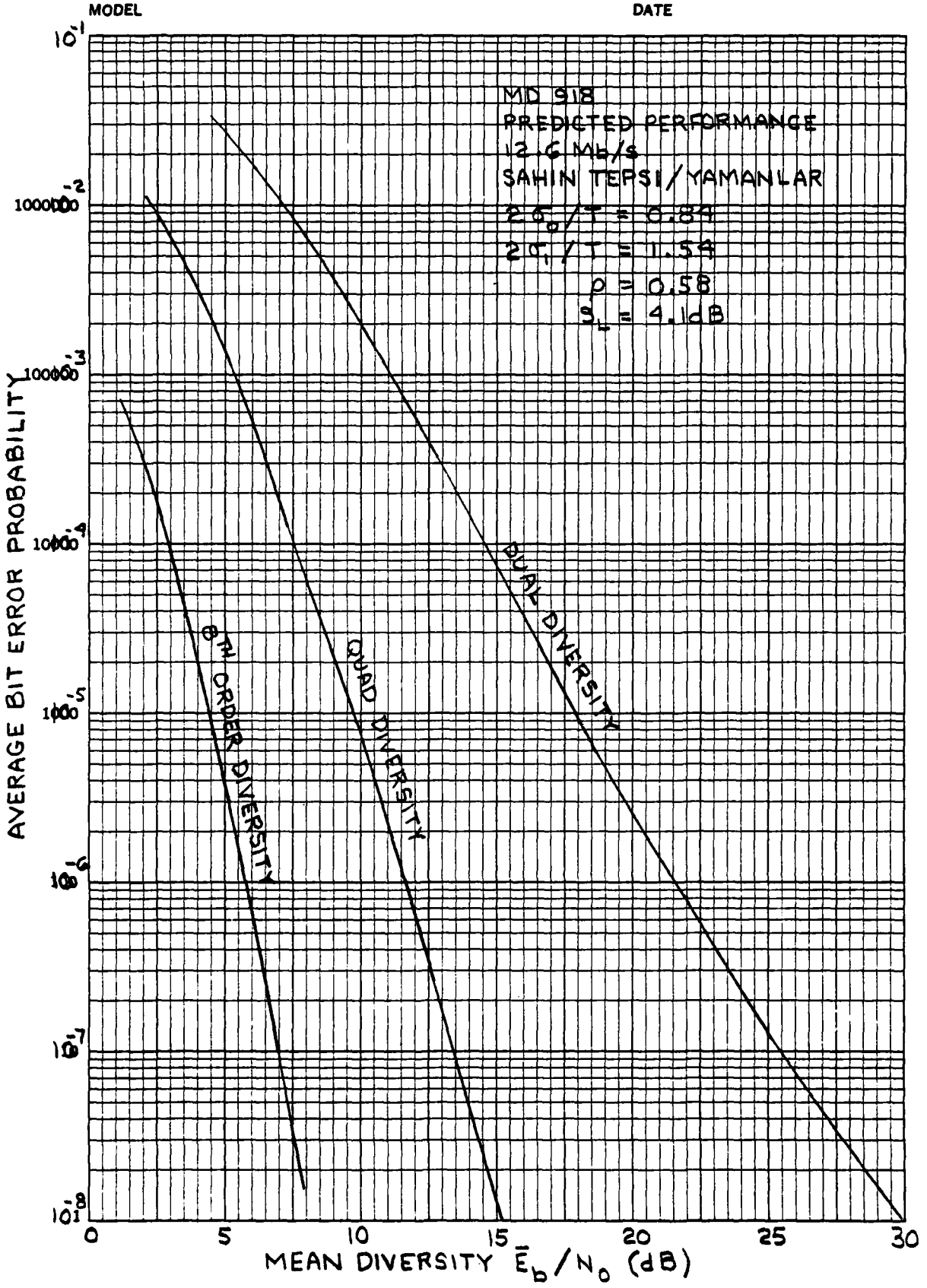
Fig. 2.9 Predicted Performance: C-Band 12.6 Mb/s



46 6463

K+E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

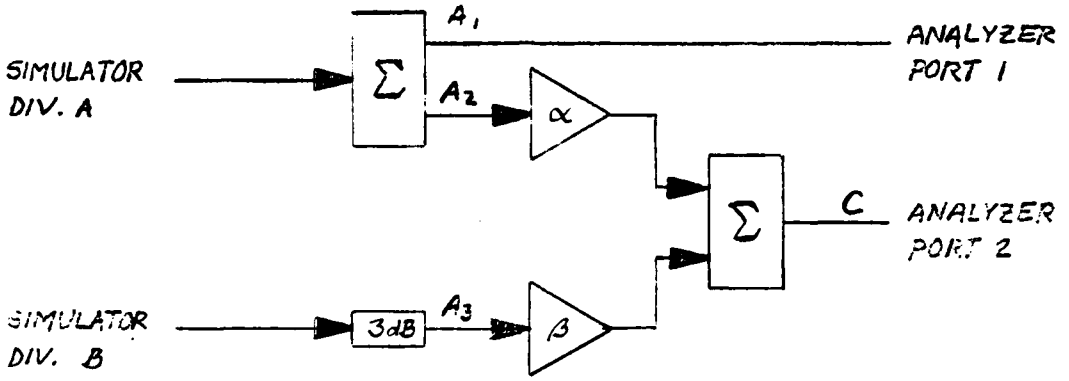
Fig. 2.10 Predicted Performance: L-Band 6.3 Mb/s



46 6463

K·E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

Fig. 2.11 Predicted Performance: L-Band 12.6 Mb/s



$$\overline{|A_1|^2} = \sigma_1^2$$

$$\overline{|A_2|^2} = \sigma_2^2 \qquad \overline{A_1 A_2^*} = \sigma_1 \sigma_2$$

$$\overline{|A_3|^2} = \sigma_3^2$$

$$\rho = \frac{A_1 C^*}{(\overline{|A_1|^2})^{1/2}(\alpha^2\overline{|A_2|^2} + \beta^2\overline{|A_3|^2})^{1/2}} = \frac{\overline{A_1(\alpha A_2 + \beta A_3)^*}}{\sigma_1(\alpha^2\sigma_2^2 + \beta^2\sigma_3^2)^{1/2}}$$

$$\rho = \frac{\alpha\sigma_1\sigma_2}{\sigma_1(\alpha^2\sigma_2^2 + \beta^2\sigma_3^2)^{1/2}}$$

When $\sigma_1 = \sigma_2 = \sigma_3$

$$\rho_{CALC} = \frac{\alpha}{\alpha^2 + \beta^2}$$

Fig. 2.12 Correlation Coefficient Analyzer Test Set-up

Several runs were then made comparing the actual coefficients obtained with the calculated coefficient. This data is in Appendix C. Figure 2.13 is a plot of ρ_{meas} vs. ρ_{calc}.

2.3 Results of Factory Tests

The data indicated successful operation of the MD-918/PDC combination for up to four diversities. The correlation coefficient analyzer was shown to function.

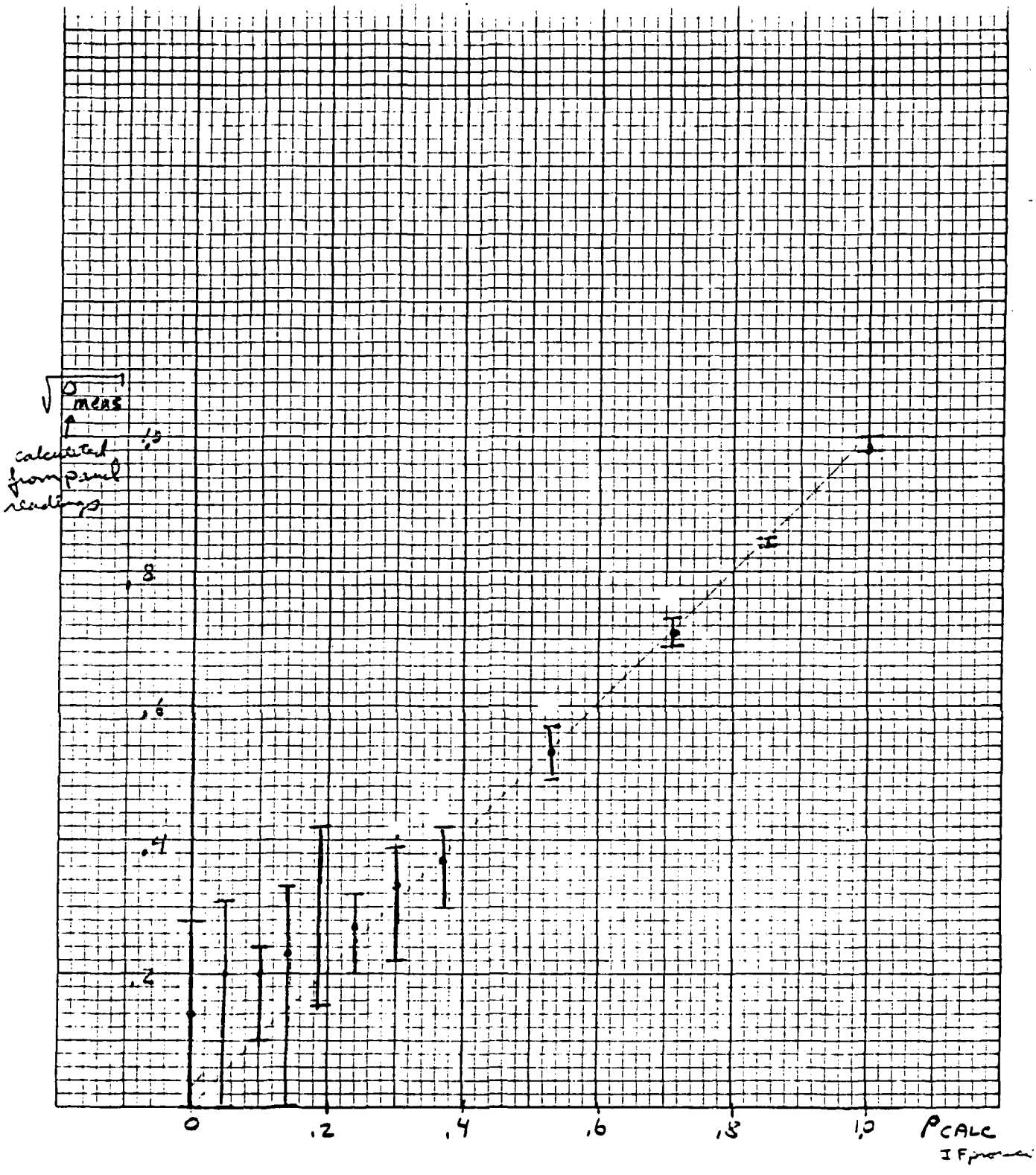


Fig. 2.13 Measured vs. Calculated Correlation Coefficient

SECTION 3
FIELD TESTS

3.1 Link Description

The RADC troposcatter test link between Youngstown and Verona, N.Y. is a 168 statute mile path operating in a dual space/dual frequency (2S/2F) configuration using 28 foot parabolic reflectors. The radio system has the military designation AN/TRC-132A. Figure 3.1 shows the link path profile. Figure 3.2 shows the link geometry for the angle diversity configuration.

Since all the data collection apparatus is located at Verona, operation was simplex, with Verona as the receive site.

3.1.1 Youngstown

The transmitter at Youngstown, N.Y. is assigned 4500 and 4690 MHz and is capable of transmitting 10 Kw at each of these two frequencies. However, for broadband test purposes, the transmitter has been tuned to a 1 dB bandwidth of approximately 10 MHz and an output power of 2 to 4 Kw. Figure 3.3 shows the frequency responses of the broadbanded reduced power transmitters.

Stable transmit and receive local oscillators are required for RAKE and digital transmission. Figure 3.4 shows the local oscillator chain used for the tests. This method, also employed for the receiver local oscillators, results in a received frequency error on the order of a few Hertz.

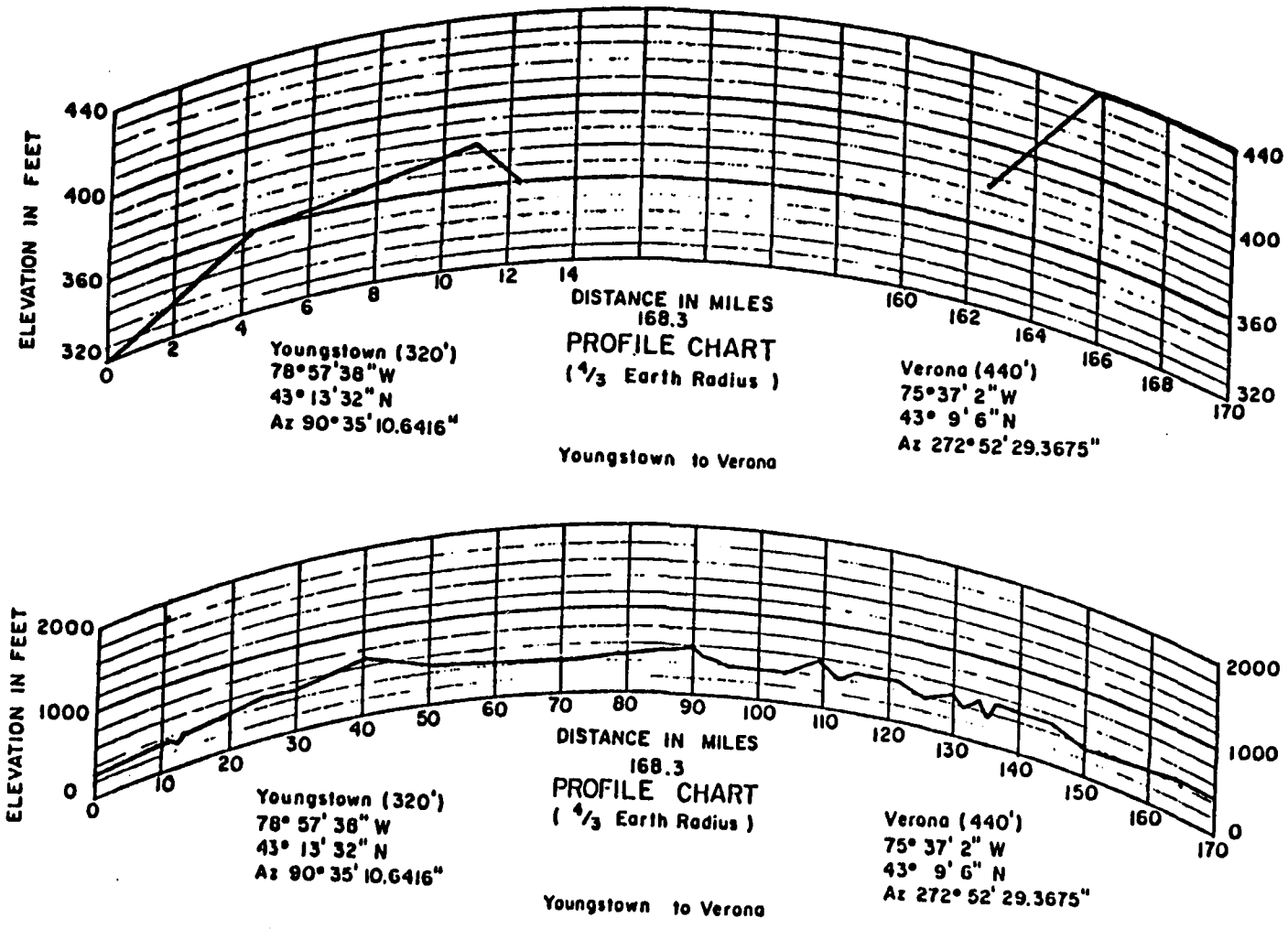


Fig. 3.1 Youngstown-Verona Path Profile

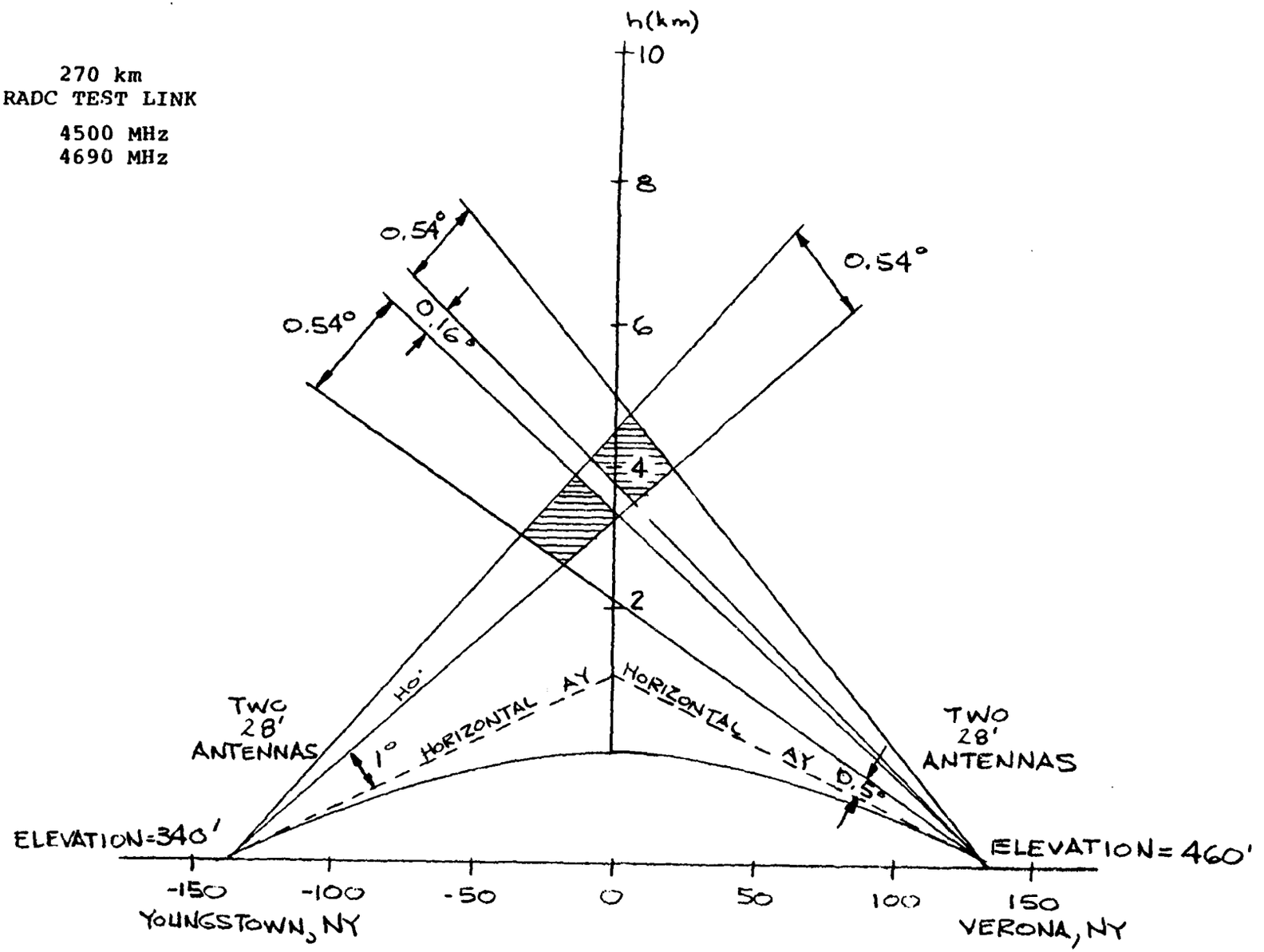


Fig. 3.2 Test Link Geometry

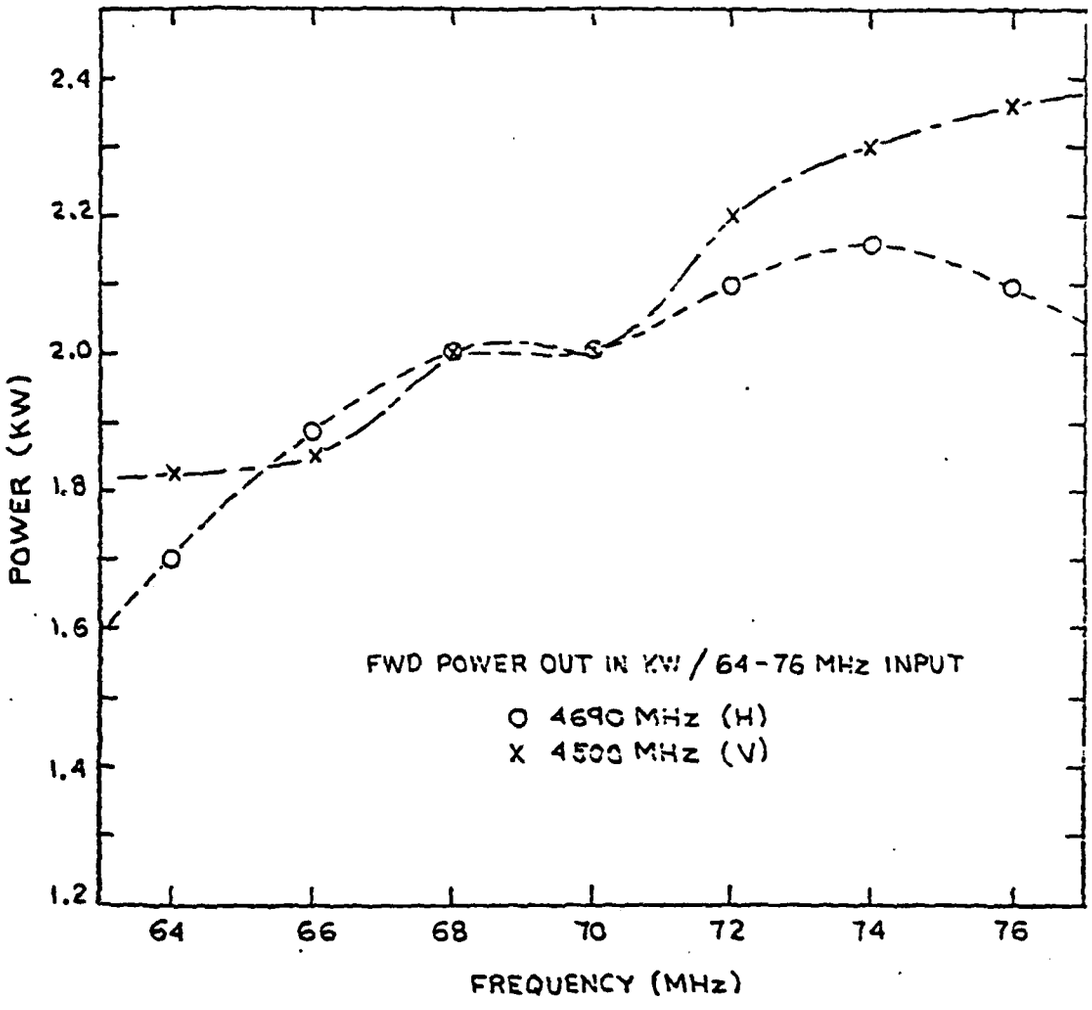


Fig. 3.3 AN/TRC-132A Transmitter Frequency Response

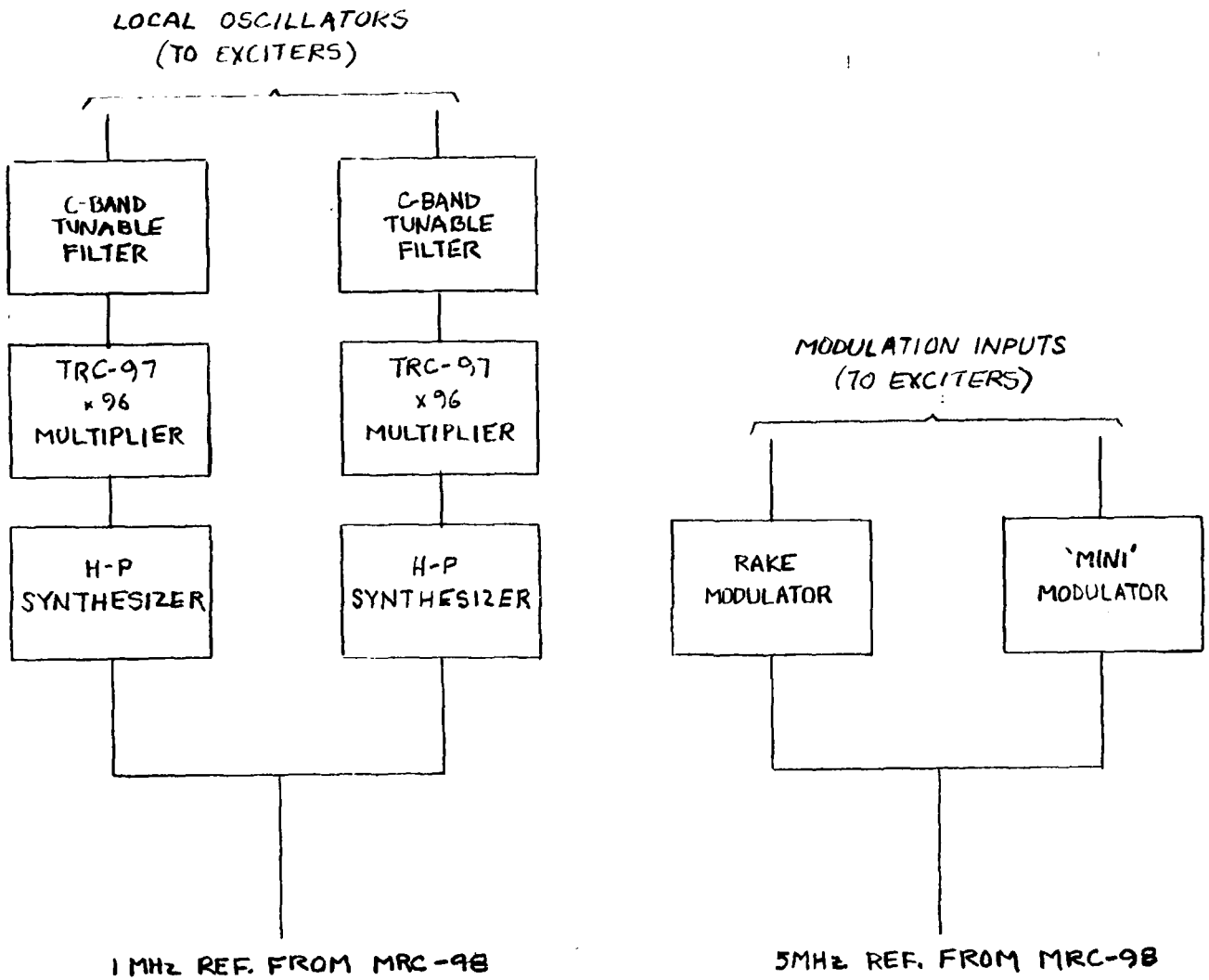


Fig. 3.4 Modified Local Oscillator Chain (Youngstown)

3.1.2 Verona Description

As normally configured, the Verona site is set up for 2S/2F reception. Therefore, an additional four receivers, two circulators, one TRC-132A van, and four additional LEL's were obtained and an interconnecting shelter was constructed between the two TRC-132A vans.

Figure 3.5 shows the antennas, vans and shelter. The receivers were modified to have 3 dB bandwidths of approximately 20 MHz. The AN/TRC-132A local oscillators were replaced with the configuration shown in Figure 3.6. Eight receiver output cables are run from the shelter to LAB 2 (where the data collection equipment is located); a 1 MHz reference is run from LAB 2 to the shelter. A telephone line allows communication between the shelter and LAB 2.

Figure 3.7 shows the data collection equipment in LAB 2. Each receiver cable from the shed feeds a splitter. One output of each splitter is filtered (to approximately the bit-rate bandwidth) then drives an LEL. The LEL's convert the 70 MHz IF signals to D-C voltages proportional to the log of the amplitude of the 70 MHz inputs. These D-C voltages are the inputs to the A/D converters in the NOVA computer.

The computer samples this data, comparing the input voltages with voltages corresponding to known received powers, and outputs received signal level (RSL) and fade rate (FR) for each receiver. The output device is a teletype, which is also used to input such parameters as number of receivers and length of test.

Calibration was done daily and almost always in the morning. The procedure required the use of a C-band signal generator, frequency counter, and a power meter.

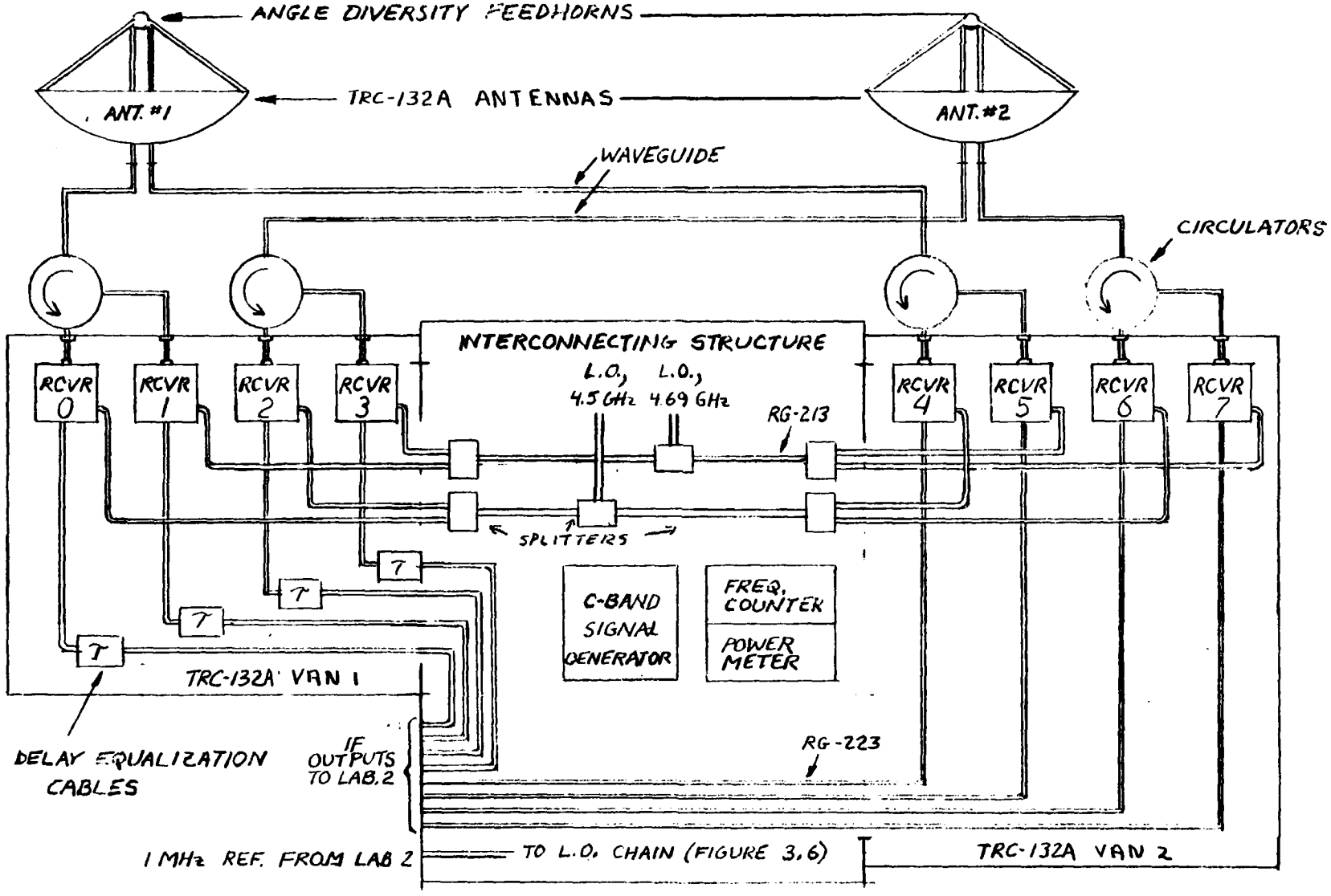


Fig. 3.5 Modified TRC-132A Receiver Set-up

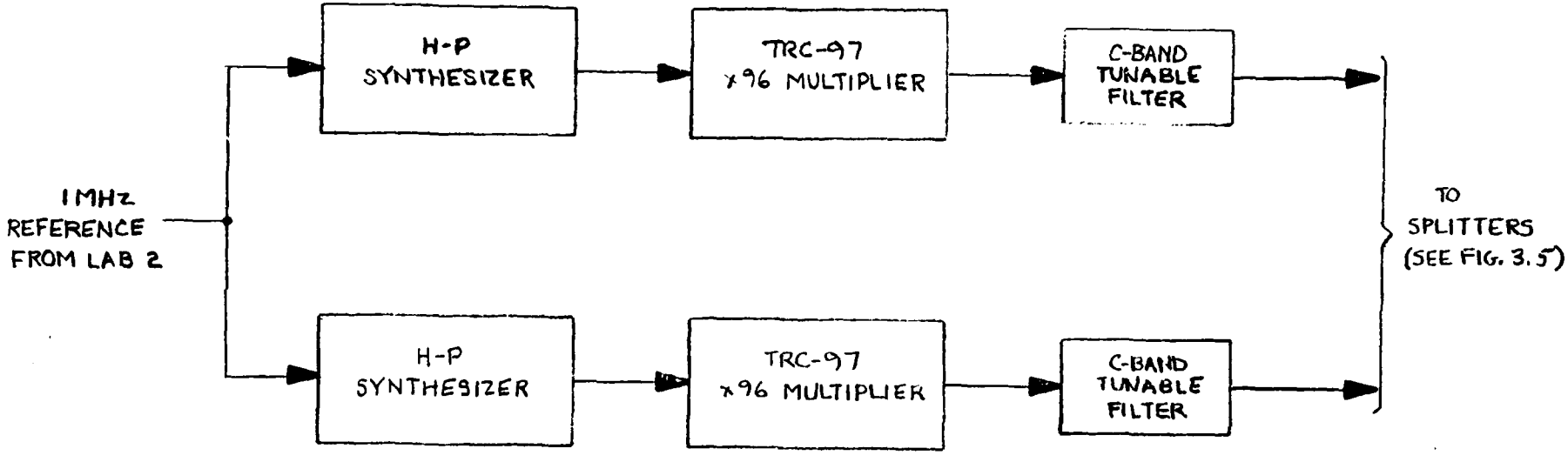


Fig. 3.6 Modified TRC-132A Local Oscillator Chain (Verona)

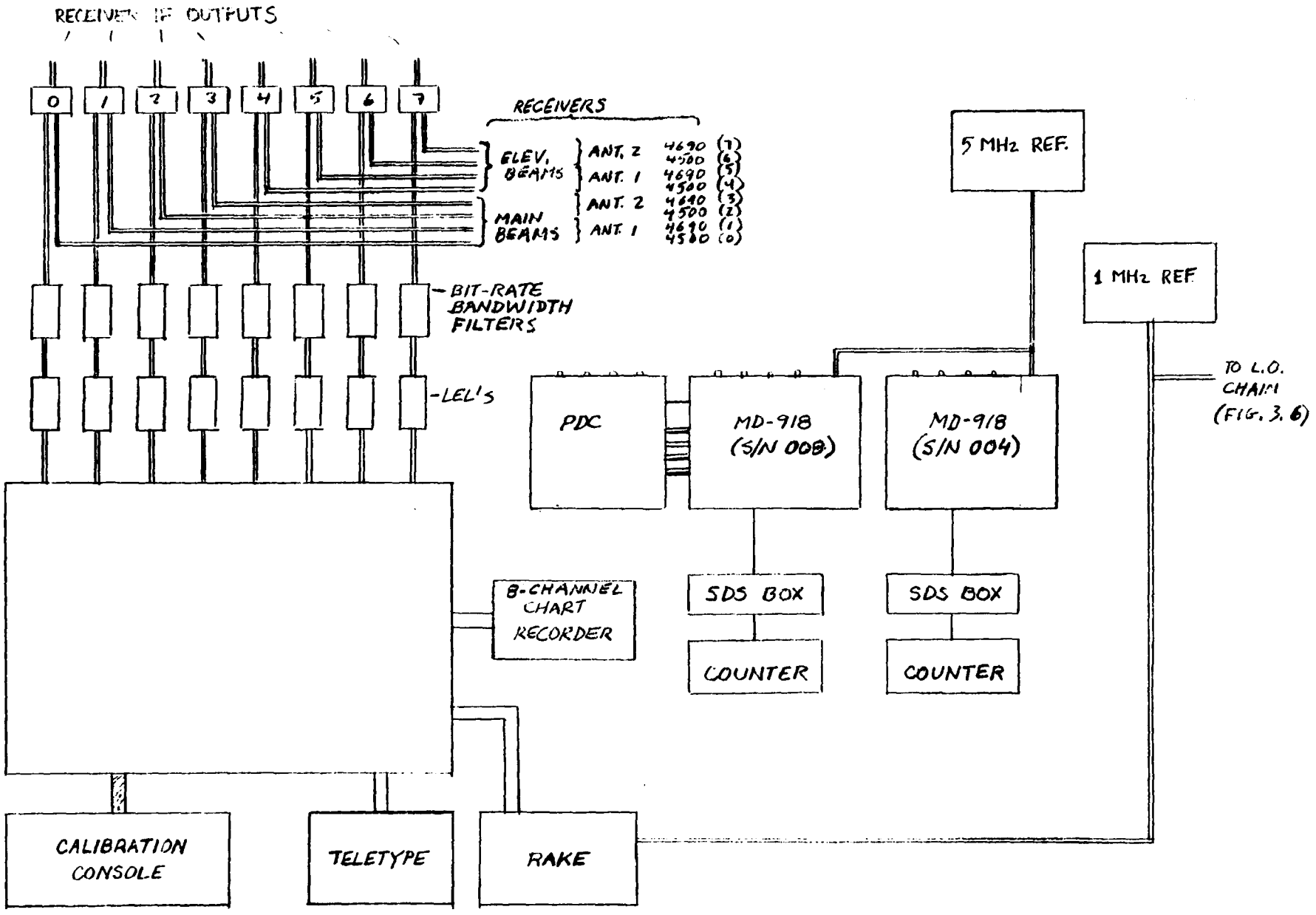


Fig. 3.7 Lab 2 Data Acquisition Set-up

The procedure also required two persons: one in the shelter and one in LAB 2 at the calibration console. The signal generator is set for frequency and its output attenuator dial checked for calibration with the power meter.

Tones (4500 and 4690) are then fed into the receivers at the following amplitudes: -110, -105, 100, -95, -90, -85, -80, -75 and -70 dBm. For each tone amplitude, a proportional d-c level is fed to the calibration system. At each level, a d-c voltage is set via a potentiometer, to "store" that voltage for the computer. This is accomplished by seeking a null on a meter that is part of the calibration console. There are 9 test levels per receiver x 8 receivers = 72 separate potentiometers to adjust.

The RAKE is a channel prober, used for making multipath spread measurements of two diversities simultaneously. It also gives the 'mean path delay' for each diversity, useful for assessing the additional delay encountered by the elevated beam. Cables are run to the RAKE from the splitter rack when needed.

The correlation coefficient analyzer was also accessed by connecting cables to the appropriate splitter.

The modems (MD-918 and MD-918/PDC) were also set up for the various configurations by moving cables around. Two modems were used to allow simultaneous testing of different configurations; specifically comparison of conventional systems against systems augmented with angle diversity.

3.1.2.1 Bit Error Rate-Related Changes

In an attempt to equalize the mean path delays of the main and elevated beam signals, delay cables were inserted at the main beam receiver outputs. Original estimates indicated a delay difference of 180 ns. This delay was reconsidered after some channel data was accumulated and the cable was shortened to a delay of 88 ns.

The receivers in the AN/TRC-132A did not have equal or near equal gain. Therefore, attenuators were inserted after the appropriate splitters so that a given input level to any of the receivers resulted in the same power level at the modem inputs.

Gain equalization is required in order to maintain the relationship between received signal power and signal-to-noise ratio. When this relationship is distorted by a sufficient amount (~10 dB) degradations due to limited dynamic range in the equalizer result.

Delay equalization is required to relieve the MD-918 adaptive equalizer of the burden of dealing with the mean delay difference between diversities.

3.1.3 Receiver Noise Figure

The four TRC-132A receivers and the additional four GFE receivers were measured for noise figure at the beginning of the field test and at least twice a month thereafter. Noise figure measurements provide the means to accurately convert received signal level values into signal-to-noise ratio.

The measurements were performed using a filter whose noise bandwidth has been calibrated by SIGNATRON. This filter is used to calibrate the noise sources in the troposcatter simulator. The test set-up for measuring noise figure is shown in Figure 3.8. A calibrated signal generator is connected to the RF receiver under measurement and tne frequency tuned to the receiver midband. The input level is set to a high but non-overdriving level. The input and output powers P_{IN} and P_{OUT} in dBm are recorded. The input to the RF receiver is then terminated and the noise power P_N at tne calibrated filter output is measured. The SNR at the input is defined as

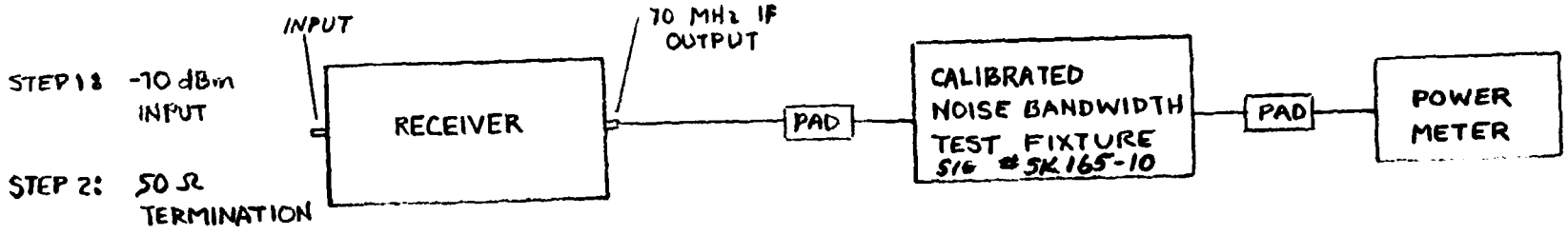
$$SNR_{IN} = P_{IN} - 174 + 10 \text{ LOG } (B_N) \text{ dB}$$

where B_N is the noise bandwidth of the calibrated filter. The SNR at the filter output is

$$SNR_{OUT} = P_{OUT} - P_N \quad \text{dB.}$$

The noise figure of the receiver is the loss in signal-to-noise ratio, i.e.,

$$NF = SNR_{IN} - SNR_{OUT} \quad \text{dB.}$$



STEP 1: $GAIN_{RCVR}$ = (POWER OUT) − (POWER IN) − (GAIN OF TEST FIXTURE) + (PADS)

STEP 2: INPUT NOISE = −((POWER OUT) + (RCVR GAIN) + (GAIN OF TEST FIXTURE) − (PADS))

(NORMALLY, NO PADDING DURING THIS STEP)

NOISE FIGURE = INPUT NOISE − NOISE FLOOR

NOISE FLOOR = $\underbrace{-174\ dBm/Hz + 60\ Hz/MHz}_{dBm/MHz} + \underbrace{10.6\ dBm/MHz}_{\text{NOISE EQUIV. BANDWIDTH OF TEST FIXTURE}} = -103.4$

Fig. 3.8 Noise Figure Measurement Procedure

These measurements and calculations of NF were performed for each of the eight receivers.

3.2 Data Taking

3.2.1 Channel Data

Channel data was taken daily (equipment and weather permitting). Channel data consisted of received signal level, fade rate, multipath spread, and correlation coefficient measurement. The RAKE can run (integrate) for slightly less than 2 minutes, or slightly less than 15 minutes. Initially, 2 minute runs were made, but resolution was poor at low signal-to-noise ratios, so 15 minute runs were instituted. A recalculation procedure was also instituted. This involved subtracting the value of the noise (defined as the level of the smallest of the 10 cells) from all the cells, then recalculating the multipath spread and mean path delays. The calculation also contained an adjustment for terminal filter characteristics.

During these runs, correlation coefficient measurements were made. For each diversity pair, several correlation measurements (each measurement takes 80 seconds) were made, and the results averaged.

A typical channel data (RSL/FR/MS) sheet is shown in Figure 3.9. A typical correlation coefficient sheet is shown in Figure 3.10.

RAKE: Freq _____ Date _____

Revrs. _____ Time _____

Test No. _____

	1	2	3	4	5	6	7	8
REL								
E.B.								

PROBER PHASE ERRORS 813

4 2 0 123 64 16 5575 4876

T	DPS
+.1000000E-06	+.1959503E+06
+.1999999E-06	+.1016295E+07
+.2999999E-06	+.3820586E+06
+.3999999E-06	+.1008217E+06
+.4999998E-06	+.2921008E+05
+.5999998E-06	+.9799817E+04
+.6999999E-06	+.6032599E+04
+.7999998E-06	+.3397935E+04
+.8999997E-06	+.2817515E+04
+.9999996E-06	+.2672043E+04

MEAN PATH DELAY = +.2346609E-06 RMS MULTIPATH SPREAD = +.1965802E-06

+.1000000E-06	+.6910508E+06
+.1999999E-06	+.2221593E+07
+.2999999E-06	+.1911553E+07
+.3999999E-06	+.5409374E+06
+.4999998E-06	+.8019625E+05
+.5999998E-06	+.1898642E+05
+.6999999E-06	+.7384308E+04
+.7999998E-06	+.3757467E+04
+.8999997E-06	+.3297129E+04
+.9999996E-06	+.3107281E+04

MEAN PATH DELAY = +.2497326E-06 RMS MULTIPATH SPREAD = +.1882264E-0

Fig. 3.9 Typical Received Signal Level/Fade Rate/Multipath Spread Data Sheet

Date	Time	Pair	Corr. Coeff	A	B	C	D	E	RSC Main	RSC Elev	Padding Main	Padding Elev	Sig Gen	
14 March	0848	1/5	428	9.5	2.8	3.2	11	13	83	90	--	3	-64	
78			447	10.5	3.05	3.2	13.5	13.5	106	34	—	3	-64	492
			500	9.5	2.9	3.0	12.5	11.5			—	3	-64	
	0855	1/5	593	9.5	3	2.8	13.5	10			—	3	-64	
	0856	3/7	267	12	3.45	3.35	18	18	85	91	6	--	-64	
			256	11.5	3.35	3.35	17.5	14	97	35	6	—	-64	
			451	[illegible]							[illegible]		[illegible]	336
		3/7	451	9.5	2.7	3.25	11	14			6	—	-64	
		3	460	9	2.3	2.8	7.5	11	90	88	—	6	-66	
			481	11.5	2.75	4.05	10.5	23	97	92	—	6	-66	566
			486	7.5	2.8	2.6	10.5	9.5			—	6	-66	
	0917	3	431	7.5	2.9	2.9	11.5	8.5			—	6	-66	
	0918	5/7	550	9.5	3.45	2.55	15.5	8	91	92	—	—	-64	
			546	9	3.3	2.5	14.5	8	40	32	—	—	-64	542
			504	7.5	2.9	2.4	11	7.5			—	—	-64	
	0925	5/7	569	[illegible]	[illegible]	2.7	[illegible]	[illegible]						

Fig. 3.10 Typical Correlation Coefficient Data Sheet

Since each channel run took ≈ 20 minutes (15 minutes plus input and output time, plus time to change cables to the RAKE), and Youngstown had to be called to change RAKE frequency halfway through the set of runs, channel data usually took 90 minutes to 2 hours. Calibration took an hour typically. Calibration was done daily, channel data was taken twice daily.

3.2.2 Bit Error Rate

The remainder of each test day was devoted to Bit Error Rate measurements. Configurations tested (at 6 MD/sec) are shown in Table 3.1.

Bit Error Rate data was taken with the set up shown in Figure 3.7. At Youngstown, a PRN sequence is generated, transmitted, received at Verona, recovered by the modem and compared to the original sequence by means of an SDS box (wnich stands for Source Data Simulator, but it is also used as a Source Data Comparator and Error Detector). This box compares the recovered data with the sequence it knows was sent, outputting an error every time a difference is detected.

A typical BER data sheet is shown in Figure 3.11.

3.3 Antenna Adjustment

The following procedure was used for antenna adjustment. First, alignment in azimuth was performed by a RΩ maximization procedure. Elevation adjustment was accomplished according to the following cirteria: the main beam at Verona is maximized by observing the RSL at Verona. Youngstown is then lowered until earth blockage decreases the RSL's at Verona, then raised slightly. A second or third iteration at Verona and Youngstown is then used to verify that the joint optimum has been found.

TABLE 3.1

CONFIGURATIONS TESTED AT 6.3 Mb/sec

CONFIGURATION	RECEIVERS
2S/2F (DUAL SPACE, DUAL FREQUENCY)	0,1,2,4
2S/2A 4.50 GHz (DUAL SPACE, DUAL ANGLE)	0,2,4,6
2S/2A 4.69 GHz (DUAL SPACE, DUAL ANGLE)	1,3,5,7
2S/2F/2A DUAL FREQUENCY, DUAL SPACE DUAL ANGLE	0,1,2,3,4,5,6,7

DIGITAL TEST LOG

DATE 26 FEB 78
START TIME 1230
STOP TIME 1240

RUN NUMBER
DATA RATE 6.3 MB/S
TRANSMIT POWER 5 & 6 KW
OPERATOR JFE

	MEDIAN RSL	MEAN SNR	COMMENTS
$S_1F_1H_1$	99 dBm (32)	dB	
$S_1F_2H_1$	99 31		
$S_2F_1H_1$	95 35		
$S_2F_2H_1$	99 29		
$S_1F_1H_2$	103 25		
$S_1F_2H_2$	106 28		
$S_2F_1H_2$	107 28		
$S_2F_2H_2$	109 22		

	DIVERSITY 2S/2F/-A	DIVERSITY 4.5 2S/-F/2A
AVG DIV SNR	4.33 dB	2.25 dB
BIT ERRORS	11.95×10^6	61.6×10^6
BIT ERROR RATE	$3.\times 10^{-3}$	1.6×10^{-2}

4.5 M

Fig. 3.11 Typical Bit Error Rate Data Sheet

A problem with this procedure was observed early on. On any given day inhomogenities in the atmosphere can result in stronger signals from the higner angles than lower angles. Thus main-beam maximization can cause the main beam to be pointed way up in the air. Final elevation adjustment requires the optimization procedure described above to be repeated on different days. The minimum pointing angles determined in this series of experiments are selected as those corresponding to homogenous condiions, would place the beams slightly above the horizon.

It is important to use this iterative procedure to aim the antennas, since operation will normally be duplex and the transmitted beams should be pointed just above the horizon.

3.4 Additional Tests

In quad angle diversity (2S/2A) set-ups, reception is on one frequency. This leaves a power amplifier and dish at the transmit end idle. If a link were to employ angle diversity, both transmitters would be tuned to the same frequency, giving a 3 dB boose in power. In order to check for any problems with two side-by-side dishes transmitting on the same frequency, Youngstown retuned the 4.5 GHz power amplifier to 4.69 GHZ and tests of bit error rate, with and without the additional P.A., were made.

Also, the angle diversity feedhorns were tested for isolation by turning on one of the Verona transmitters (only one was operational) and taking bit error rate measurements.

On March 28, 29, 30 channel data was taken for 8 hours each day.

These tests are discussed in Section 4.

3.5 Down Time

Data collection on a daily basis was not possible. Most problems were equipment-related, though operator error made re-calibration necessary on several occasions.

From September thru early October 1977, tests were confined to quad diversity, as the additional four receivers and two circulators had not arrived. The first weeks were used for set-up, provision of sufficient L.O. power, noise figure tests, gain equalization, removal of oscillations in the (previously) broad-banded IF strips, and activation of the RAKE.

Early tests were impaired by two problems at Youngstown. The first was faulty operation of an SDS card, the second was related to the local oscillator scheme. Communication with Youngstown caused several synthesizer changes, to no avail. A trip to Youngstown to deliver an SDS box (related to the first problem) led to an alternate scheme for locking the synthesizers to the 1 MHz standard. This alteratate scheme solved the problem.

There was a failure of a PDC card in mid-October, and failures of the teletype.

Some time was spent investigating receiver 3 (Ant. #2, Main, 4.69 GHz), which had a reduced RSL (relative to the other main beams). No explanation was found.

The link was unavailable during late October. In early November, testing was resumed. The new receivers were installed. Noise figures were taken.

In early November, the first look at the angle diversity beams was available. This led to some confusion, as the statistical nature of the squint loss was not fully recognized. A long series of antenna adjustment exercises ensued, until the adjustment criteria of Section 3.3 was adopted.

During this time period, various methods of determining the proper length of the delay equalization cable were tried. One involved a series of bit error rate measurements with various lengths. The results were not clear, as any variations in the bit error rate were obscured by the changing channel, (also, the MD-918 is capable, within limits, of adjusting to the differential delay). Another method involved running one modem on the main beams, and one modem on elevated beams, then viewing the 'eyes' of the two modems. The relative location of data transitions was viewed, and the elevated beam could be observed to move over a range of $\approx$ 100 nanoseconds, at a rate comparable to the fading of the channel. It became apparent that an accumulation of rake data, to evaluate the relative delay on a statistical basis, was necessary, as mentioned in Section 3.1.2.1.

By mid-December, testing on a regular basis began. In late December, a metal plate, part of the adjustment mechanism on one of the TRC-132A dishes was broken. This caused no immediate problem, but by late January, it became apparent that this dish (Antenna #1) had moved (down and to the right) due to the broken plate. Reception on this dish was degraded 3 to 5dB. The plate was repaired in mid-February, and the antenna re-aligned.

In early January, a heat exchanger pump failed at Youngstown, causing operation to be limited to 4.69 GHz. The teletype also failed again, reducing operation to SLVTS. Both the teletype and the 4.5 GHz P.A. were down for approximately two weeks.

The high winter path loss resulted in many days of unuse-ably weak signals. Also, the civilian contractor was stranded in Boston during - and after - a blizzard in February, 1978.

There were a few power failures (or deliberate interruptions for repair work) which forced recalibration after power was resumed.

March was a fairly successful month. In early April, the switch to 12 Mb/s was made and data taking became erratic as the civilian operator concentrated on various tests, reconfigurations and measurements to attempt to isolate the 12 Mb/s problem. These tests are mentioned in Section 5.

SIGNATRON testing ended in late May.

SECTION 4
TEST DATA

4.1 Channel Data

The data accumulated in this program was entered into computer files for processing. All channel data presented here (except correlation coefficient) was obtained by taking only one sample per 6 hour period.

Figure 4.1 shows the distributions of the composite received signal levels for:

(1) the main beams (receivers 0,1,2,3)

(2) the 2S/2A configurations to which 3dB has been added to simulate an additional power amplifier.

This figure is critical in assessing the viability of angle diversity as an alternate to frequency diversity. The implications of these results are discussed more fully in the Final Report [1.3].

Figure 4.2 shows the distributions of the received signal levels for the individual receivers. Figure 4.3 shows the distributions of the squint loss for the four space/angle pairs.

Figures 4.4, 4.5, 4.6, and 4.7 are the multipath spreads and normalized delays for the four space/angle pairs. Note that the median of the path delays indicate that 88 n sec was a good estimate of the length of the delay equalization cable. Also note that the elevated beams have larger multipath spreads, as is expected with a larger common volume.

Figure 4.8 gives the distributions of the composite fade rates of the main beams (receivers 0,1,2,3) and the elevated beams (receivers 4,5,6,7).

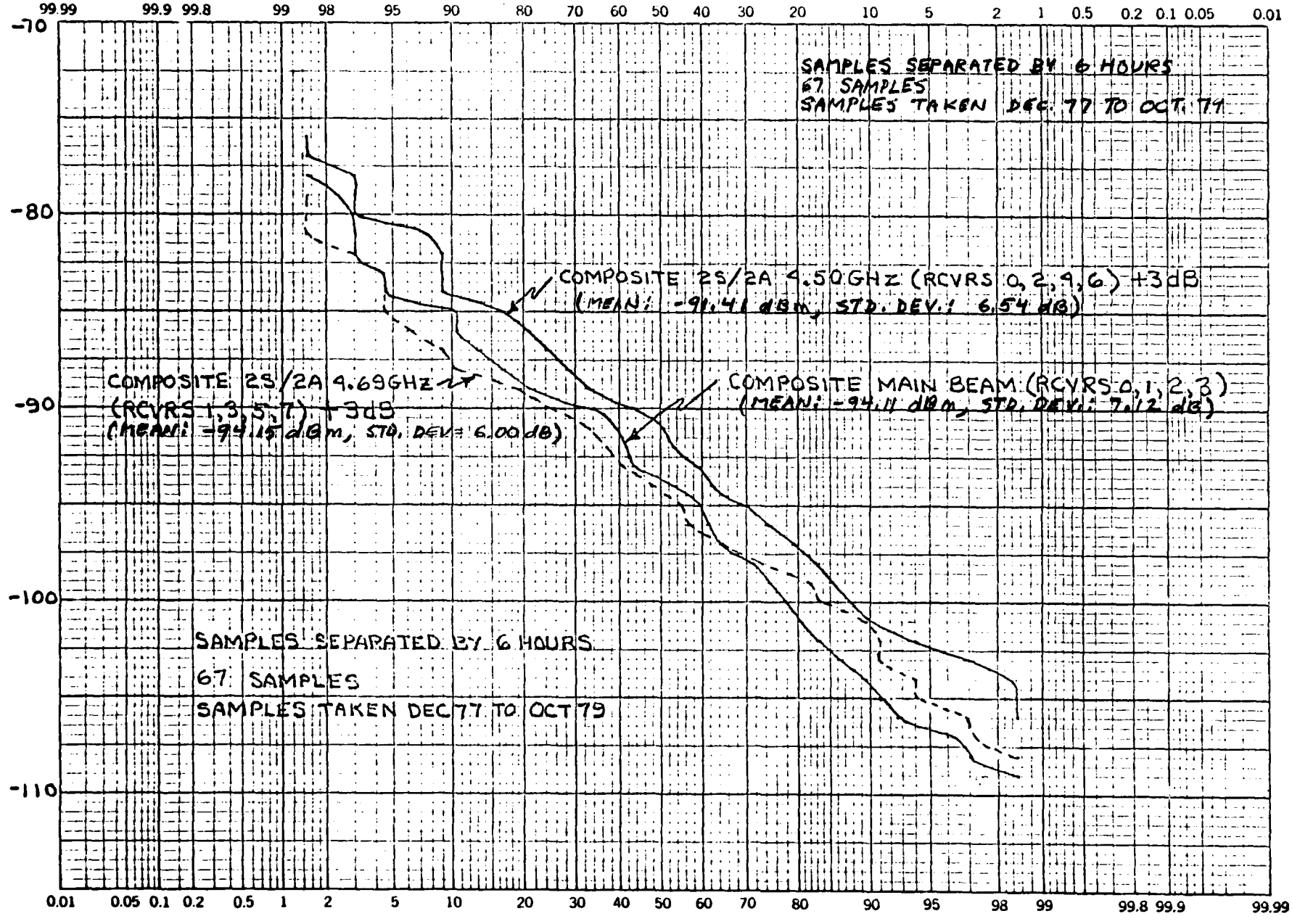
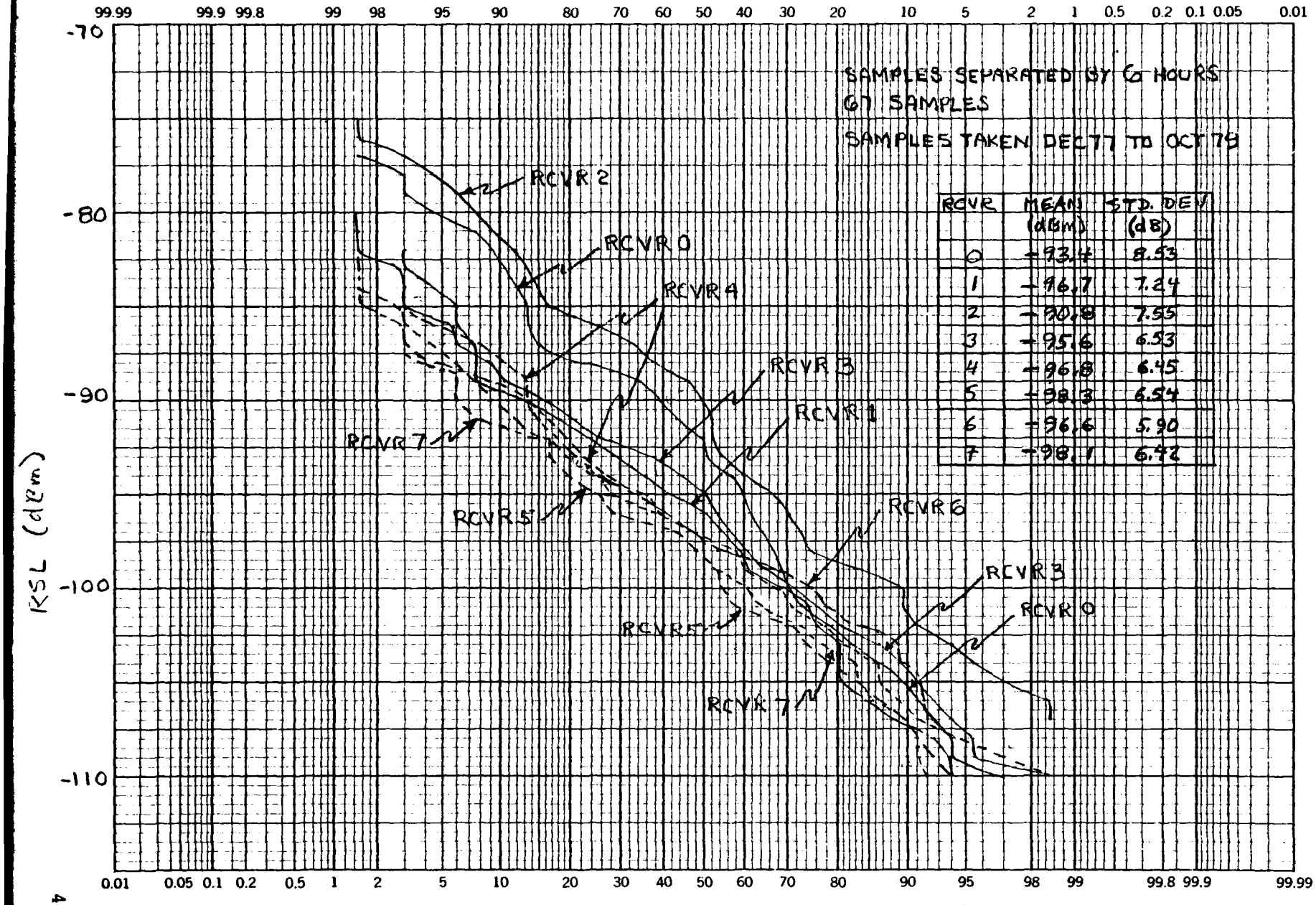


Figure 4.1 Composite RSL Distributions, with 3dB Added to Angle Diversity Configurations



RCVR	MEAN (dBm)	STD. DEV (dB)
0	-93.4	8.53
1	-96.7	7.24
2	-90.8	7.55
3	-95.6	6.53
4	-96.8	6.45
5	-98.3	6.54
6	-96.6	5.90
7	-98.1	6.42

Fig. 4.2 Individual Receiver RSL Distributions

K•Σ PROBABILITY X 90 DIVISIONS
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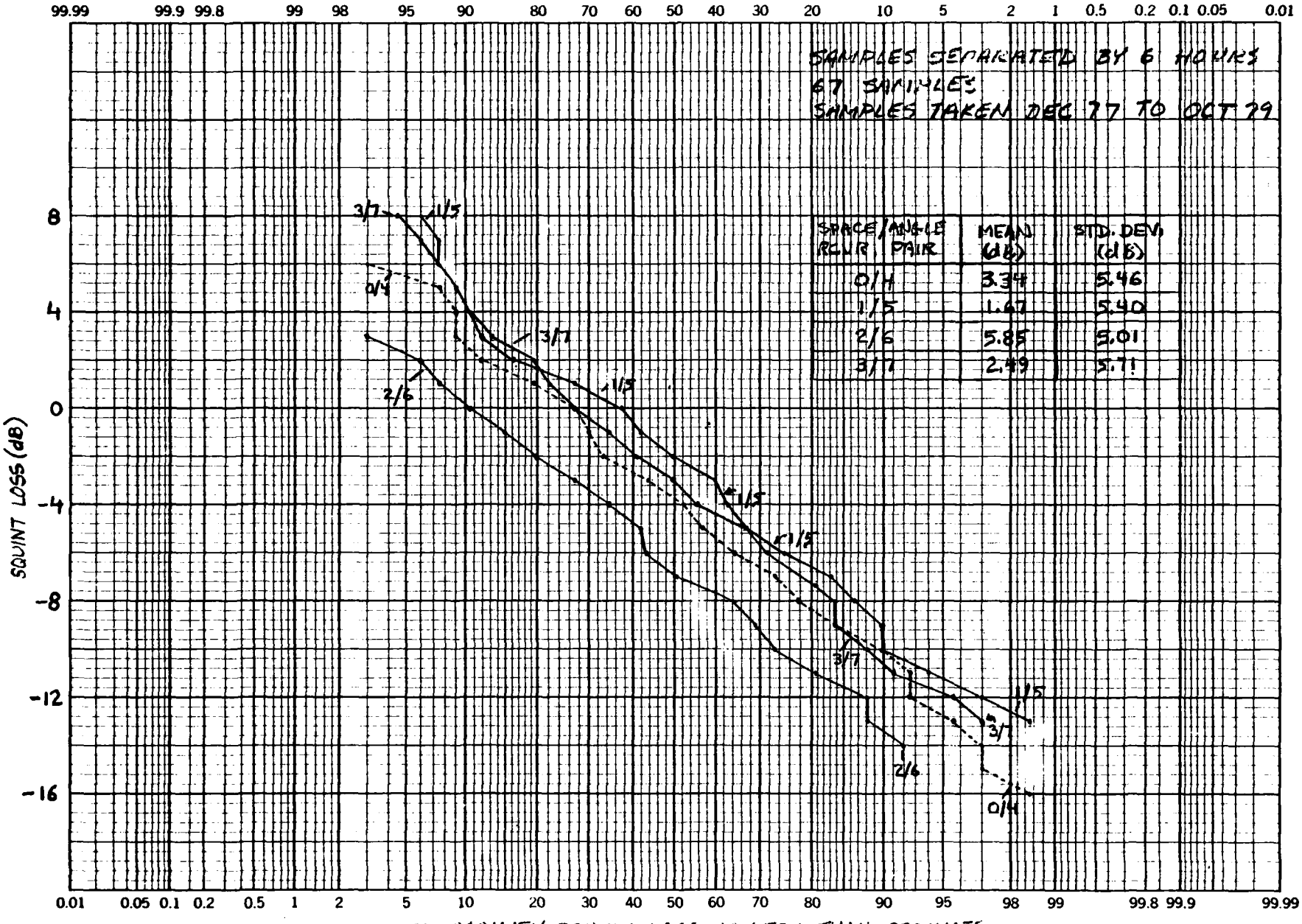

Fig. 4.3 Squint Loss Distributions

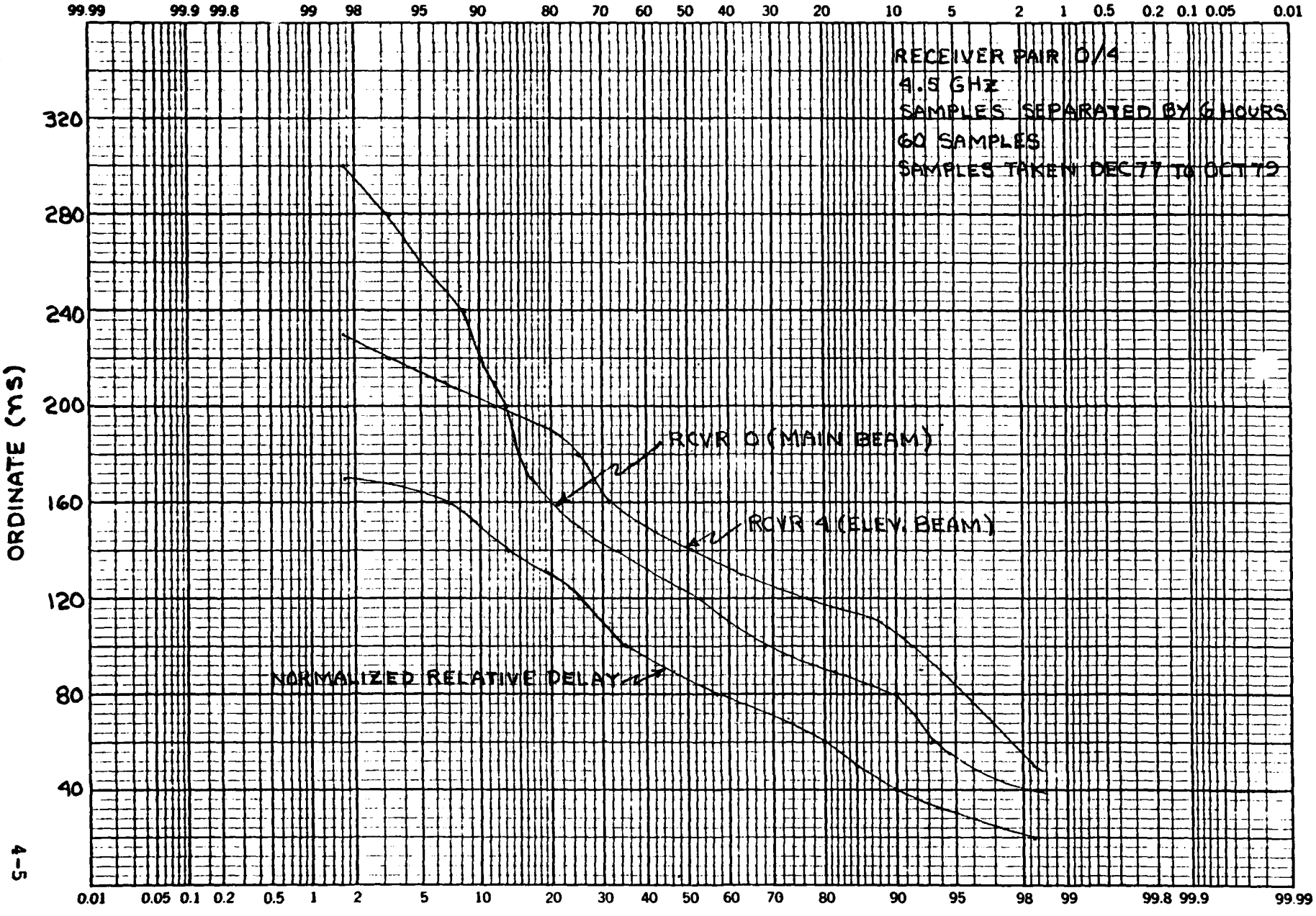

Fig. 4.4 Multipath Spreads and Relative Delay, Space/Angle Pair 0/4

K·E PROBABILITY X 90 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.
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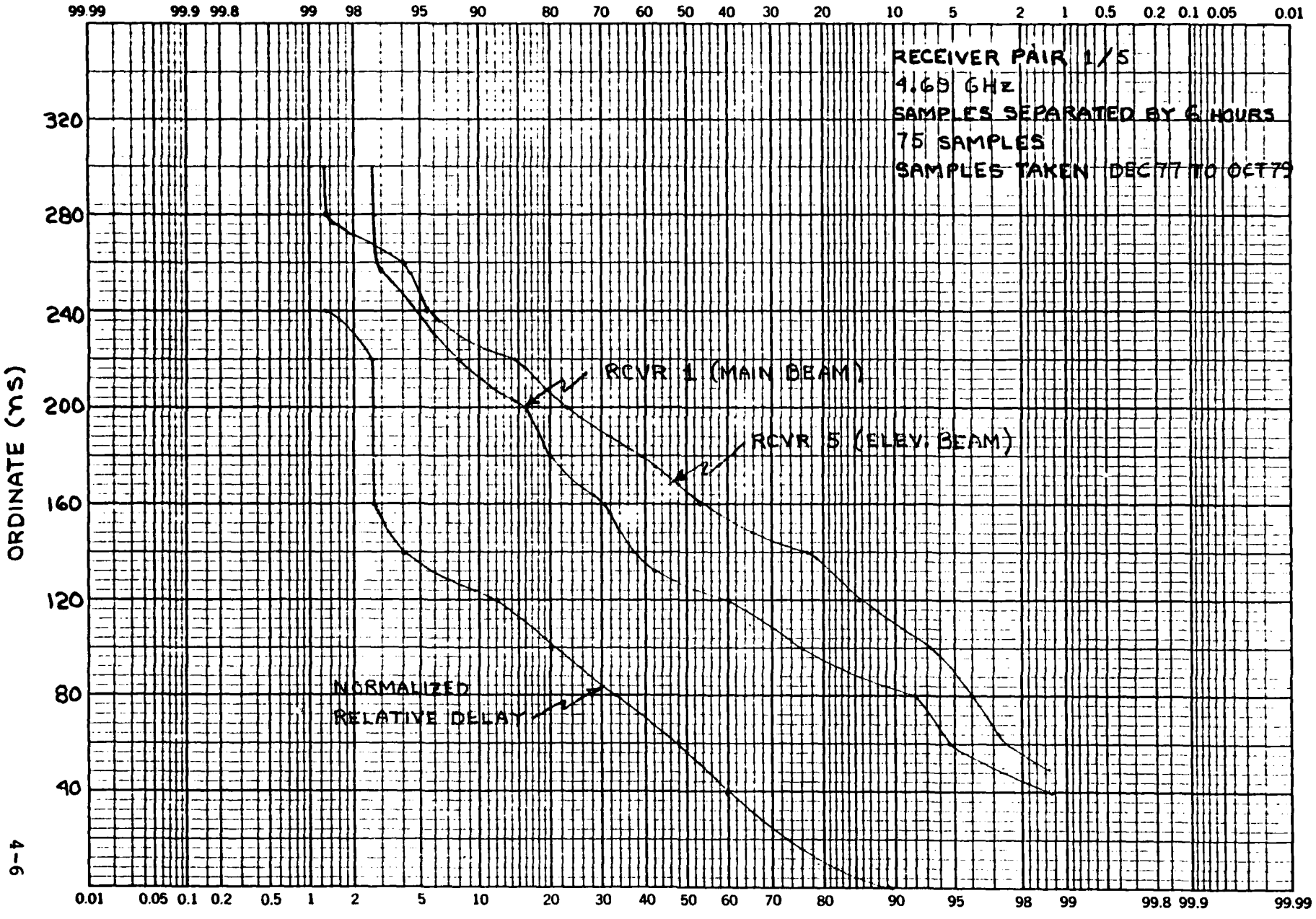

Fig. 4.5 Multipath Spreads and Relative Delay, Space Angle Part 1/5

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KEUFFEL & ESSER CO MADE IN U.S.A.
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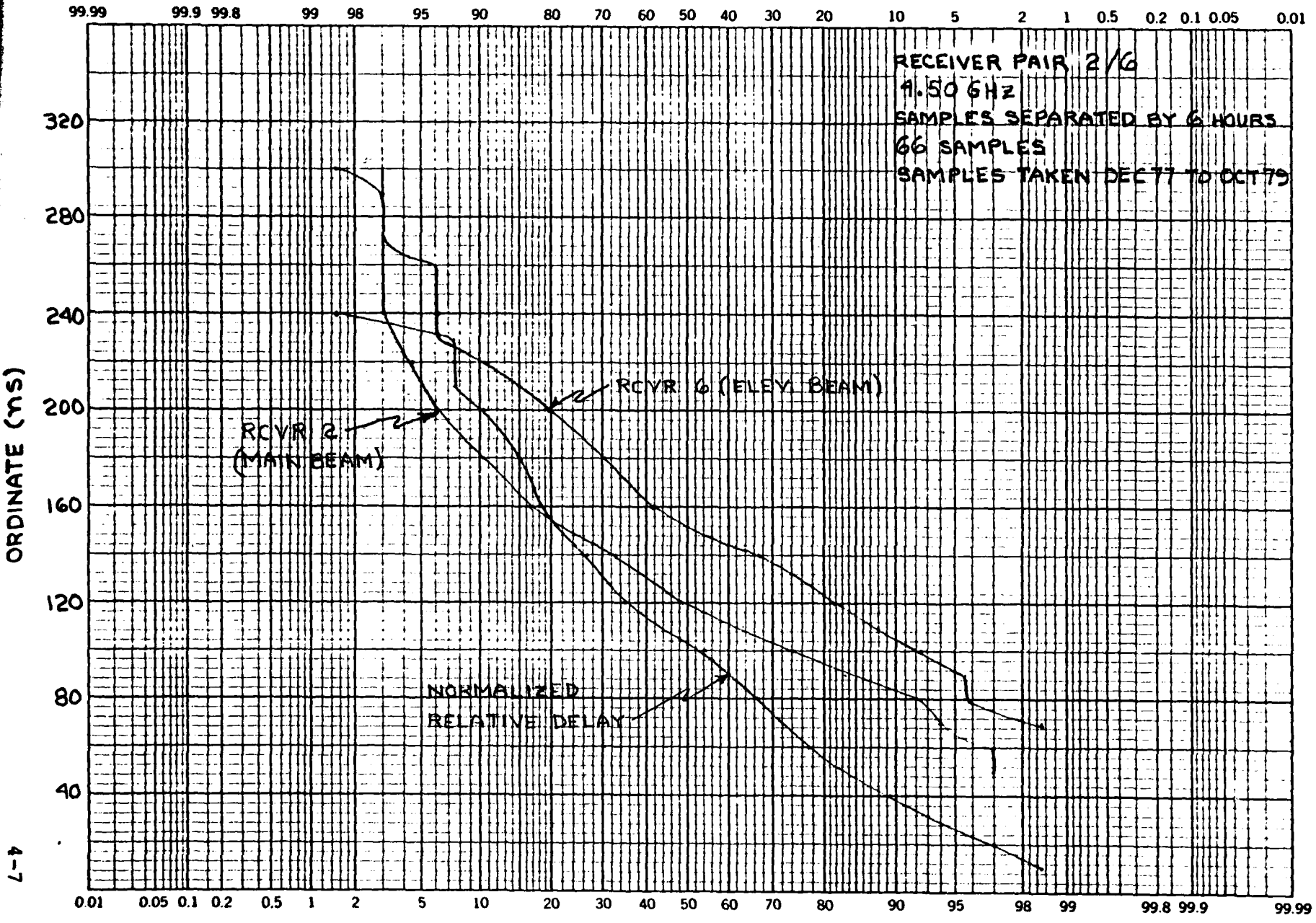

Fig. 4.6 Multipath Spreads and Relative Delay, Space/Angle Pair 2/6

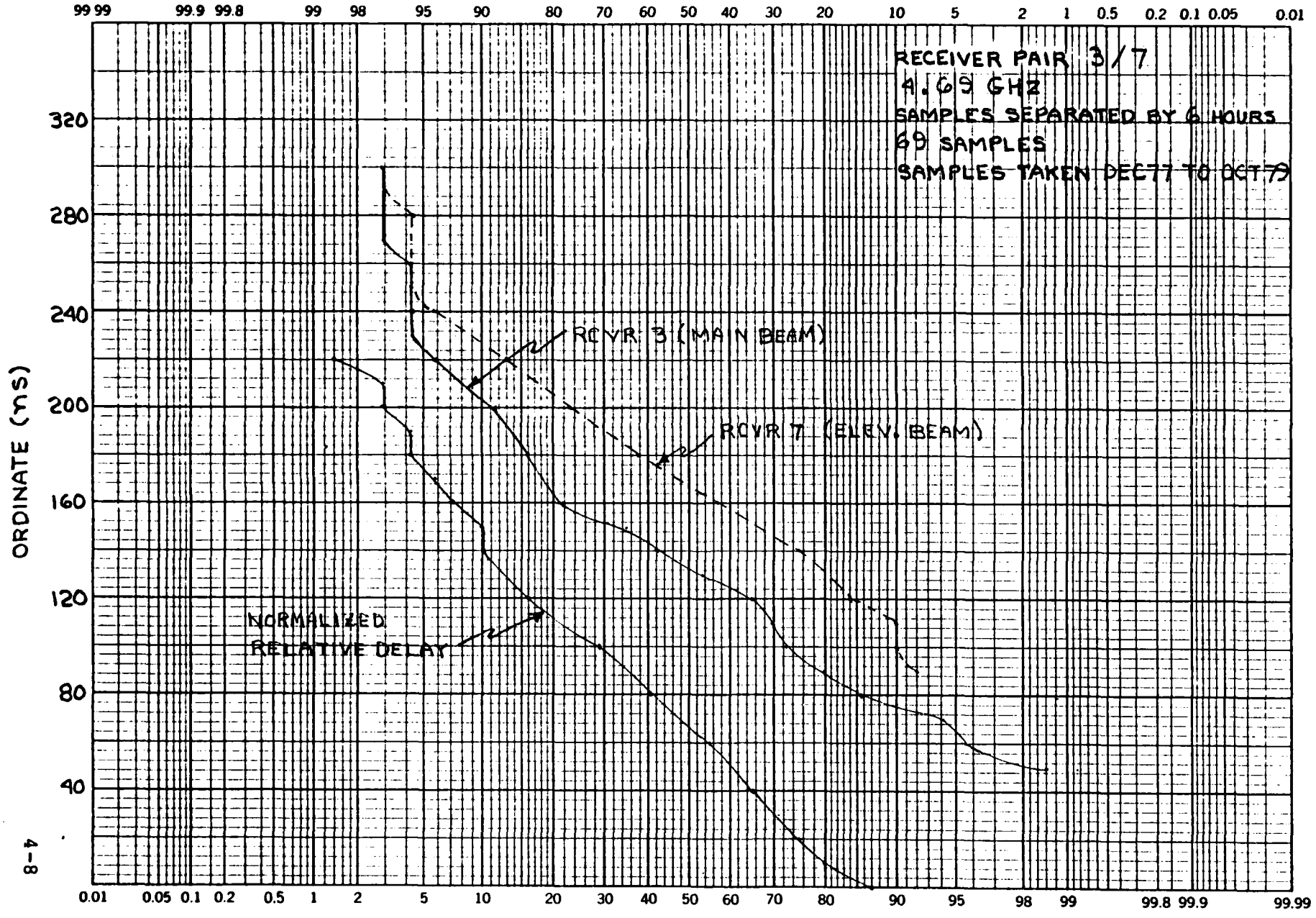

Fig. 4.7 Multipath Spreads and Relative Delay, Space Angle Pair 3/7

K•E PROBABILITY X 90 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.

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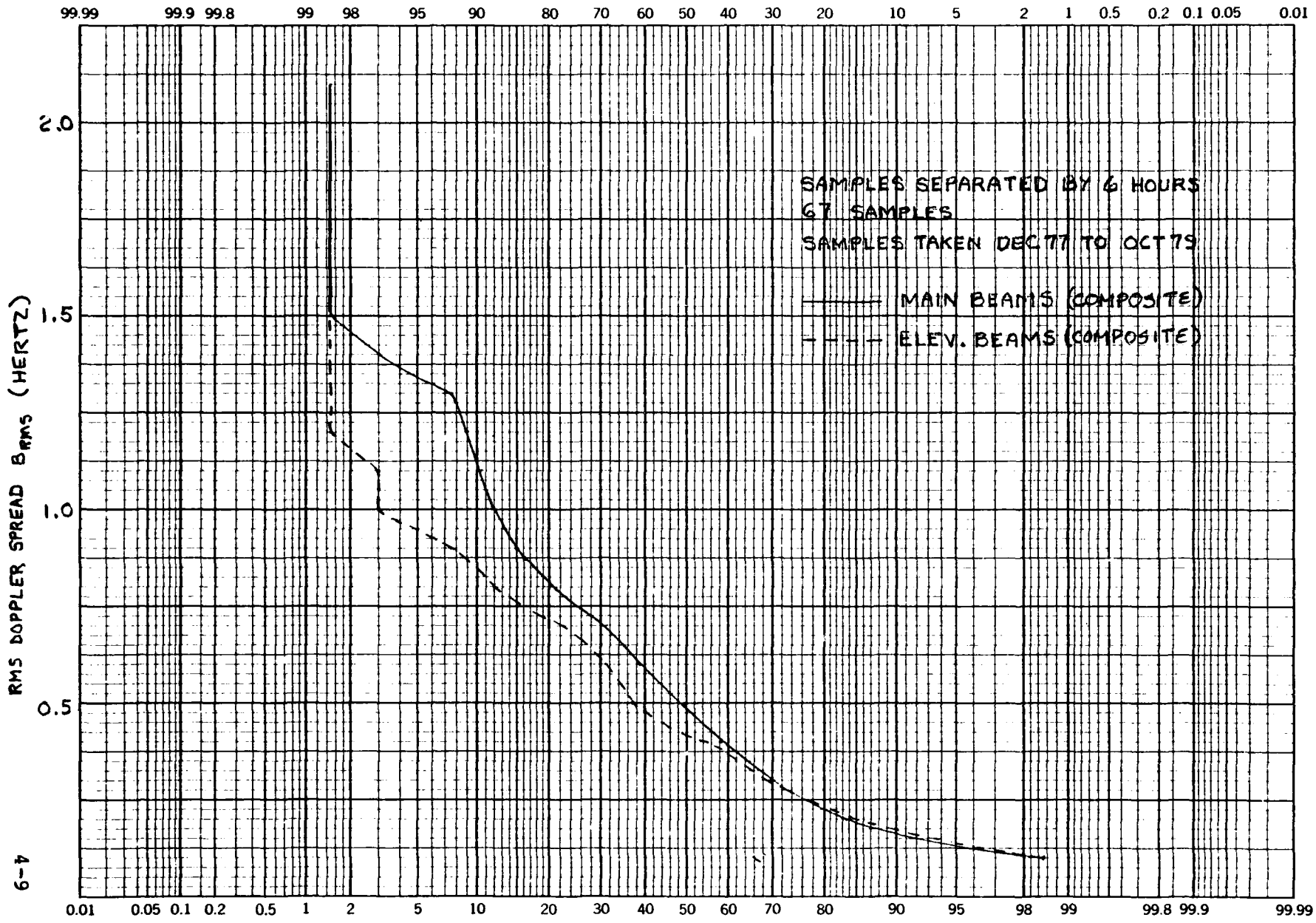

Fig. 4.8 Composite RMS Doppler Spreads

Figure 4.9 gives the distributions of the correlation coefficients for the space/angle pairs, and the distribution of the correlation coefficients between main beams of the same frequency, or different (crossed) frequencies.

SIGNATRON does not have confidence in the correlation coefficient data. Approximately 30% of the individual measurements had to be discarded as not physically possible (magnitude greater than 1, and/or roots of negative numbers). A test of the correlation coefficient between the noise output from two receivers indicated a correlation coefficient of 1, when it should have been 0. On the basis of 30% bad tests, noise correlation coefficient of 1, and the fact that the calibration of the analyzer was done in the absence of noise, SIGNATRON advises against making conclusions on the basis of this data.

4.2 Bit Error Rates

Due to the degraded data at 12 Mb/s, only the 6 Mb/sec bit error rate data was entered. Figures 4.10, 4.11, 4.12 and 4.13 show the configurations 2S/2F, 2S/2A 4.69 GHz, 2S/2F vs. 2S/2A 4.5 GHz, and 2S/2F vs. 2S/2F/2A respectively, plotted against Mean Diversity $\bar{E}b/N_o$. Figure 4.14 shows 2S/2F vs. 2S/2F/2A plotted against Mean Main Beam diversity $\bar{E}b/N_o$. The quad diversity data indicates that the modems have no trouble with the delay difference or increased multipath spread of the elevated beam.

The 2S/2F/2A data is worse than the prediction by 2 - 3 dB. This configuration could not be factory tested, and there may have been some diversity combining loss.

Figure 4.15 shows 2S/2F vs. 2S/2A 4.50 GHz, with 2S/2A 4.69 GHz, all plotted against main beam path loss.

K&E PROBABILITY X 90 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.

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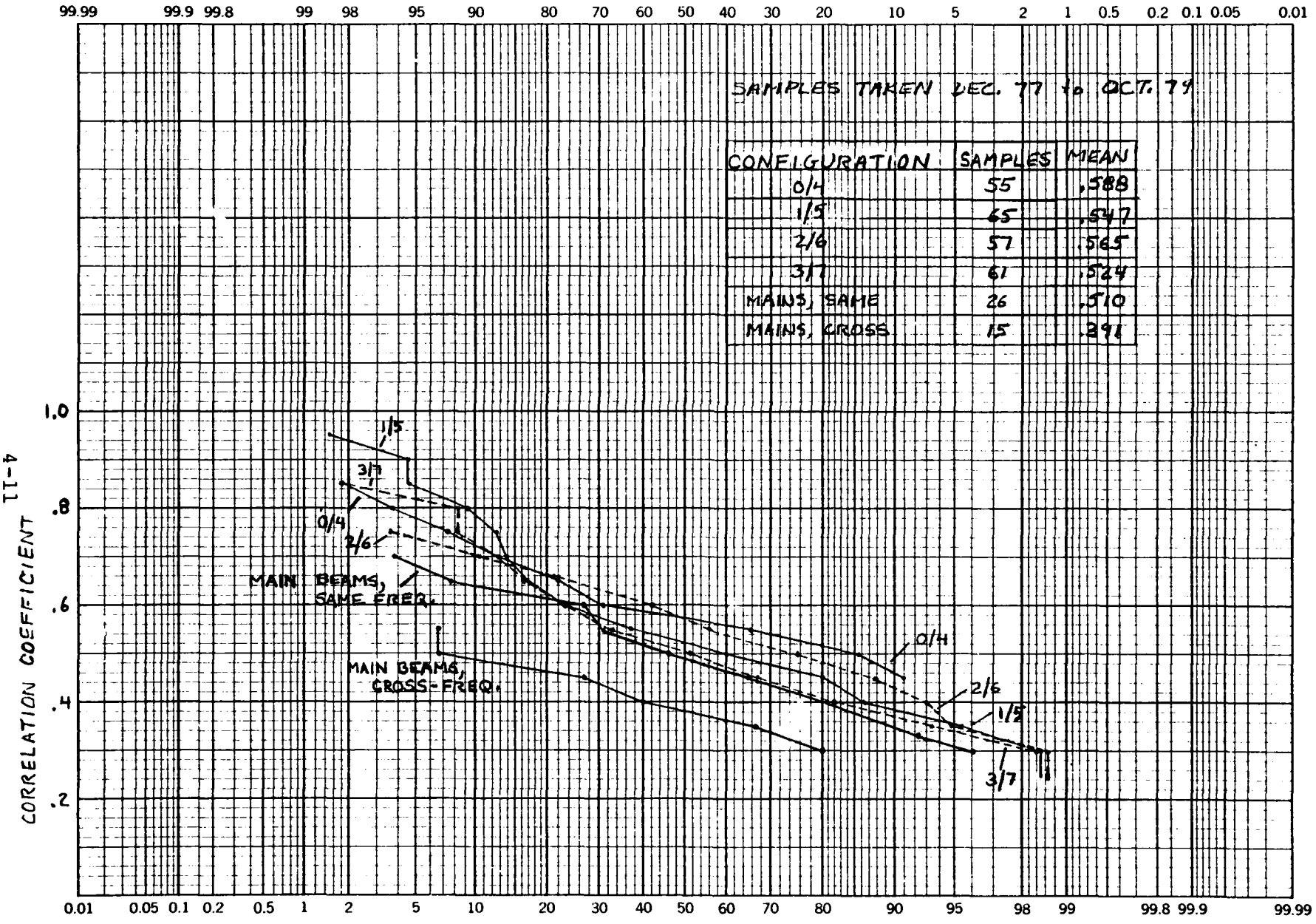


Fig. 4.9 Correlation Coefficient Distributions

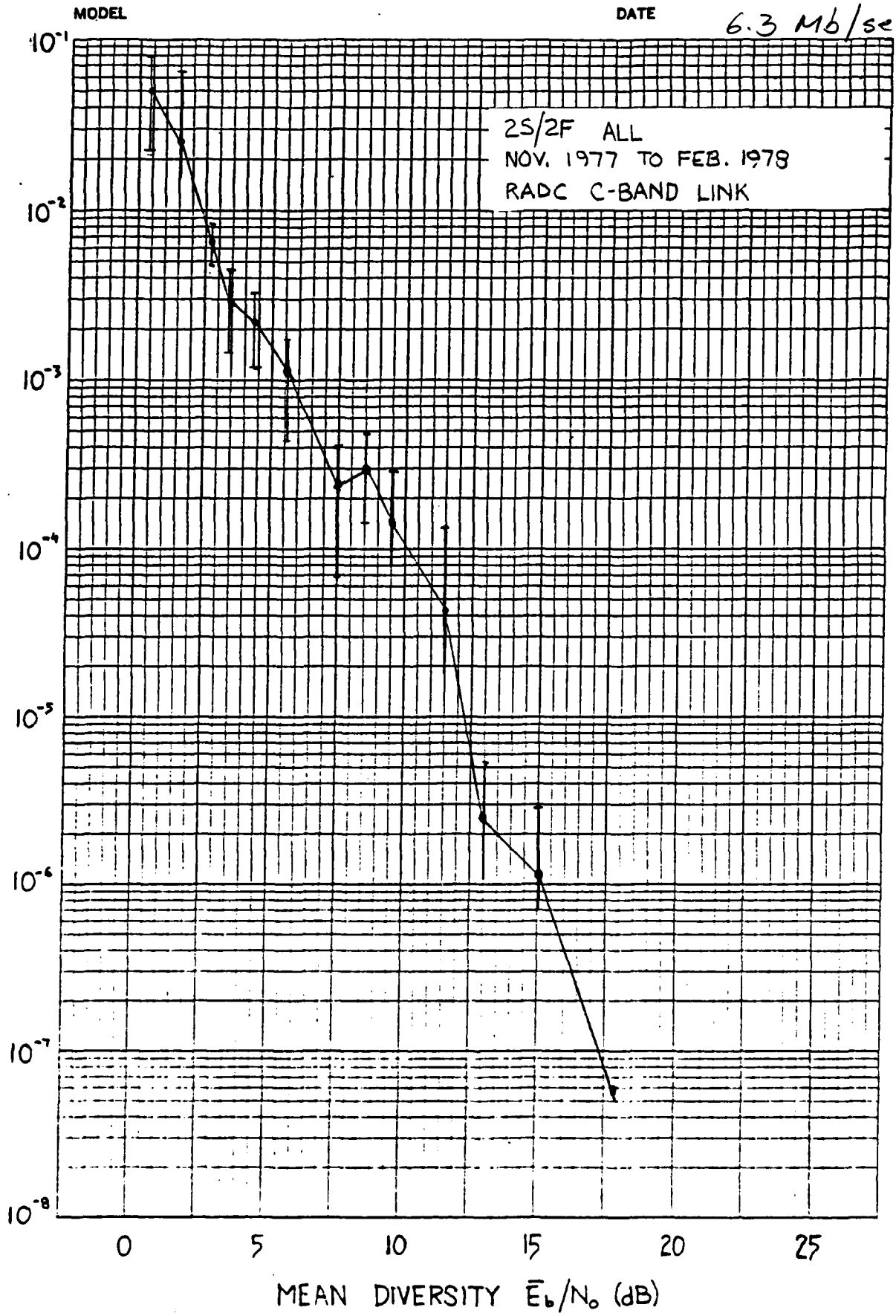


Fig. 4.10 All 2S/2F Data

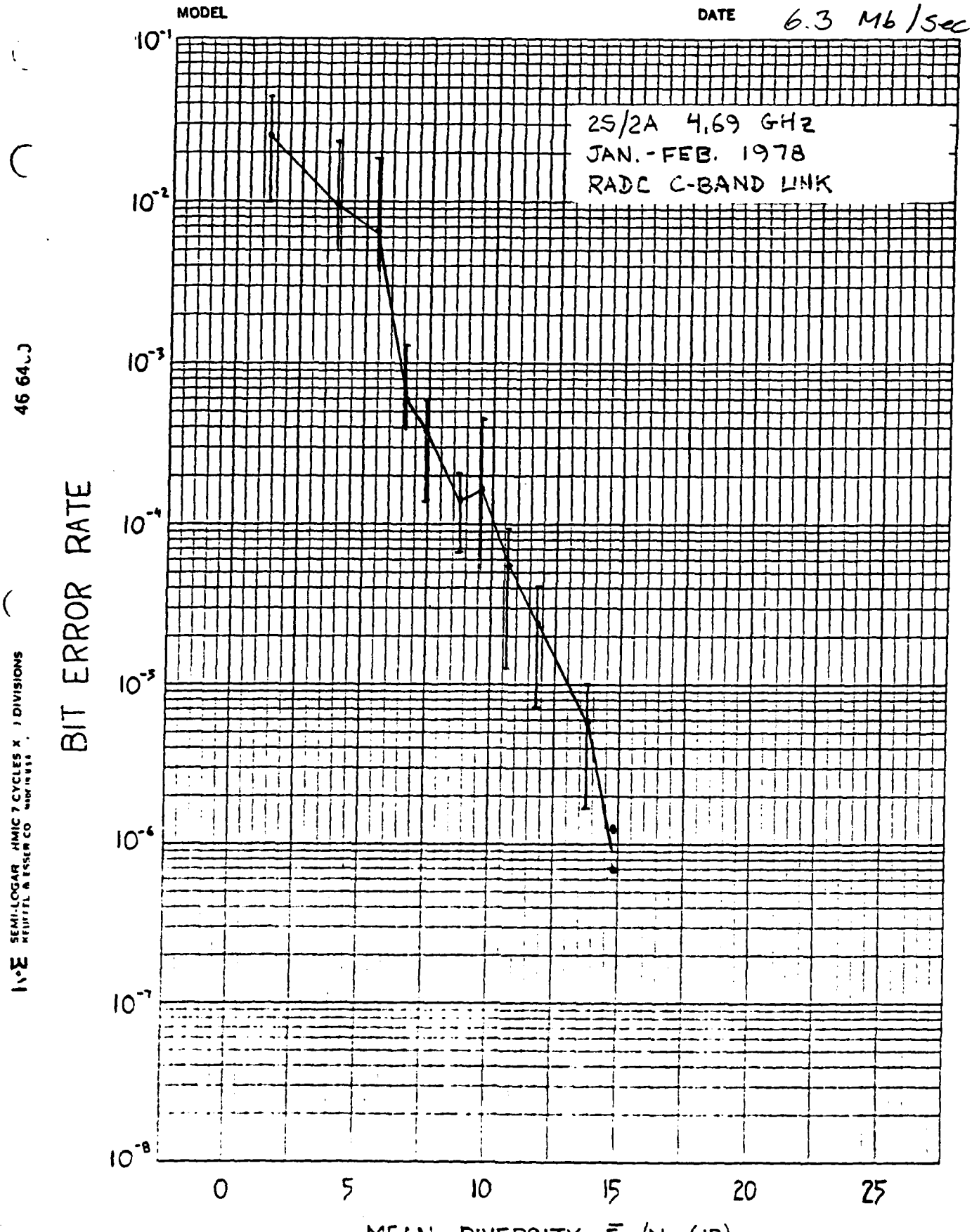


Fig. 4.11 All 2S/2A 4.69 GHz Data

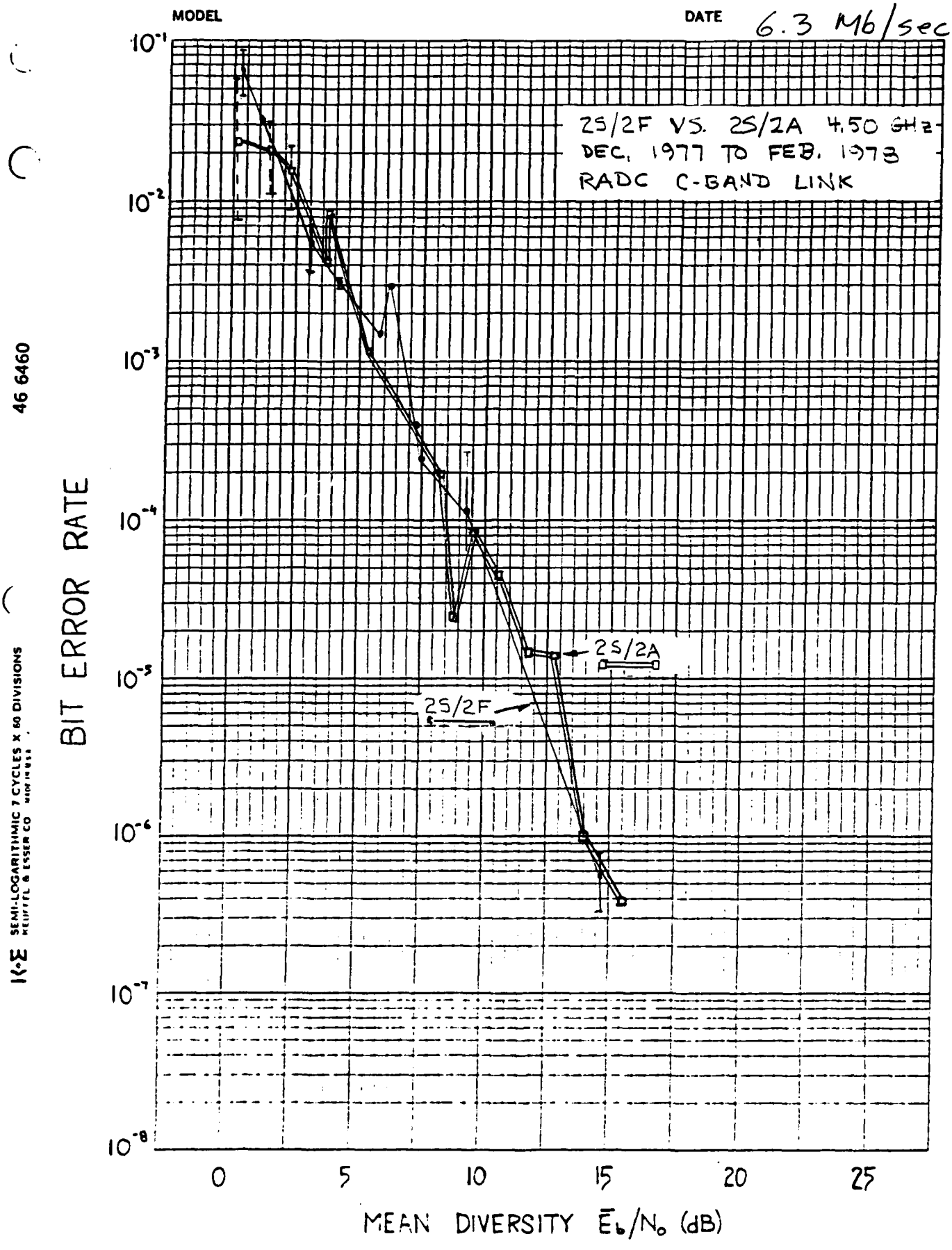


Fig. 4.12 2S/2F vs. 2S/2A 4.50 GHz

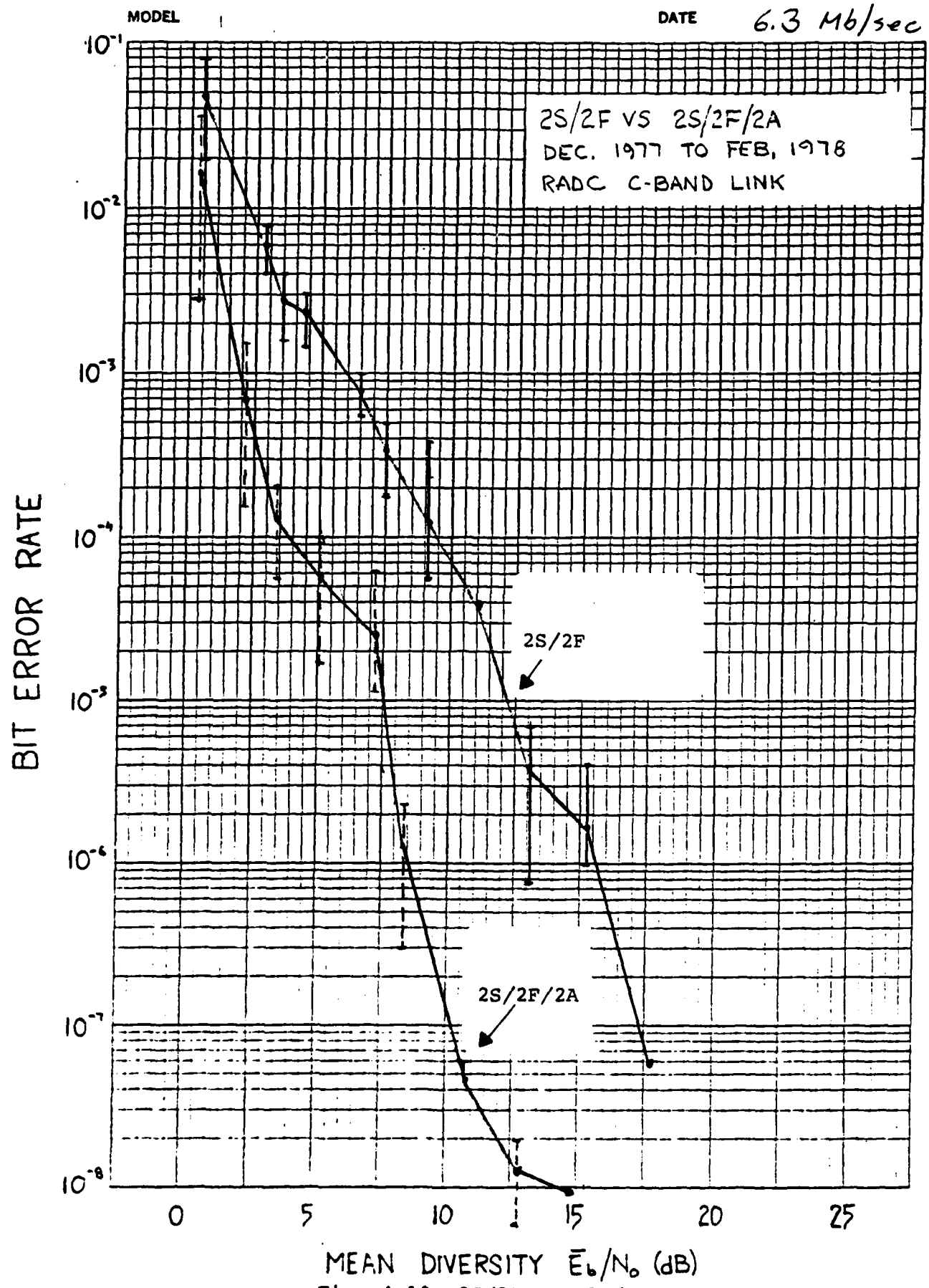
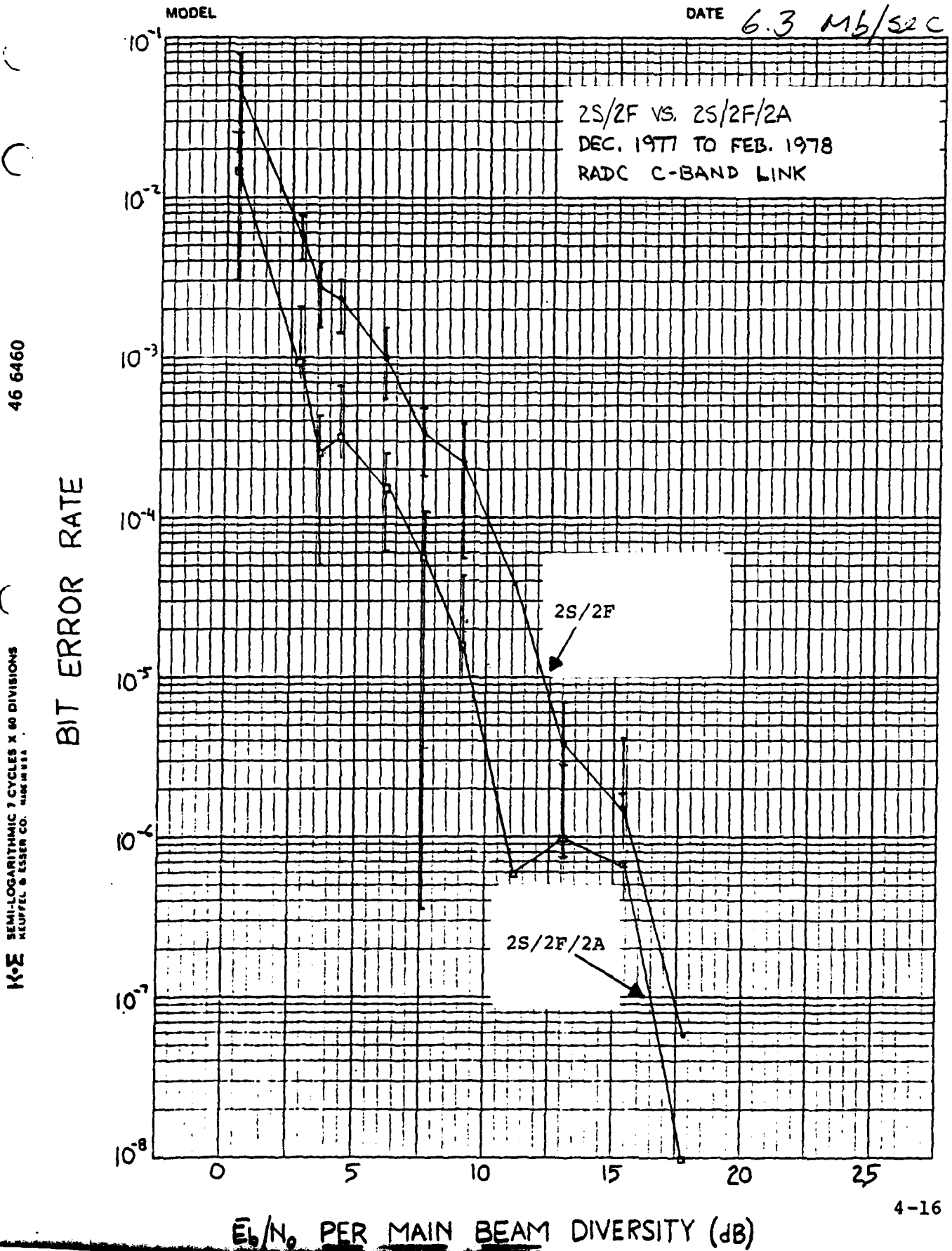


Fig. 4.13 2S/2F vs. 2S/2F/2A


MODEL
DATE 6.3 Mb/sec
2S/2F VS. 2S/2F/2A
DEC. 1977 TO FEB. 1978
RADC C-BAND LINK
2S/2F
2S/2F/2A
BIT ERROR RATE
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
0
5
10
15
20
25
E_b/N_o PER MAIN BEAM DIVERSITY (dB)
46 6460
K+E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO.

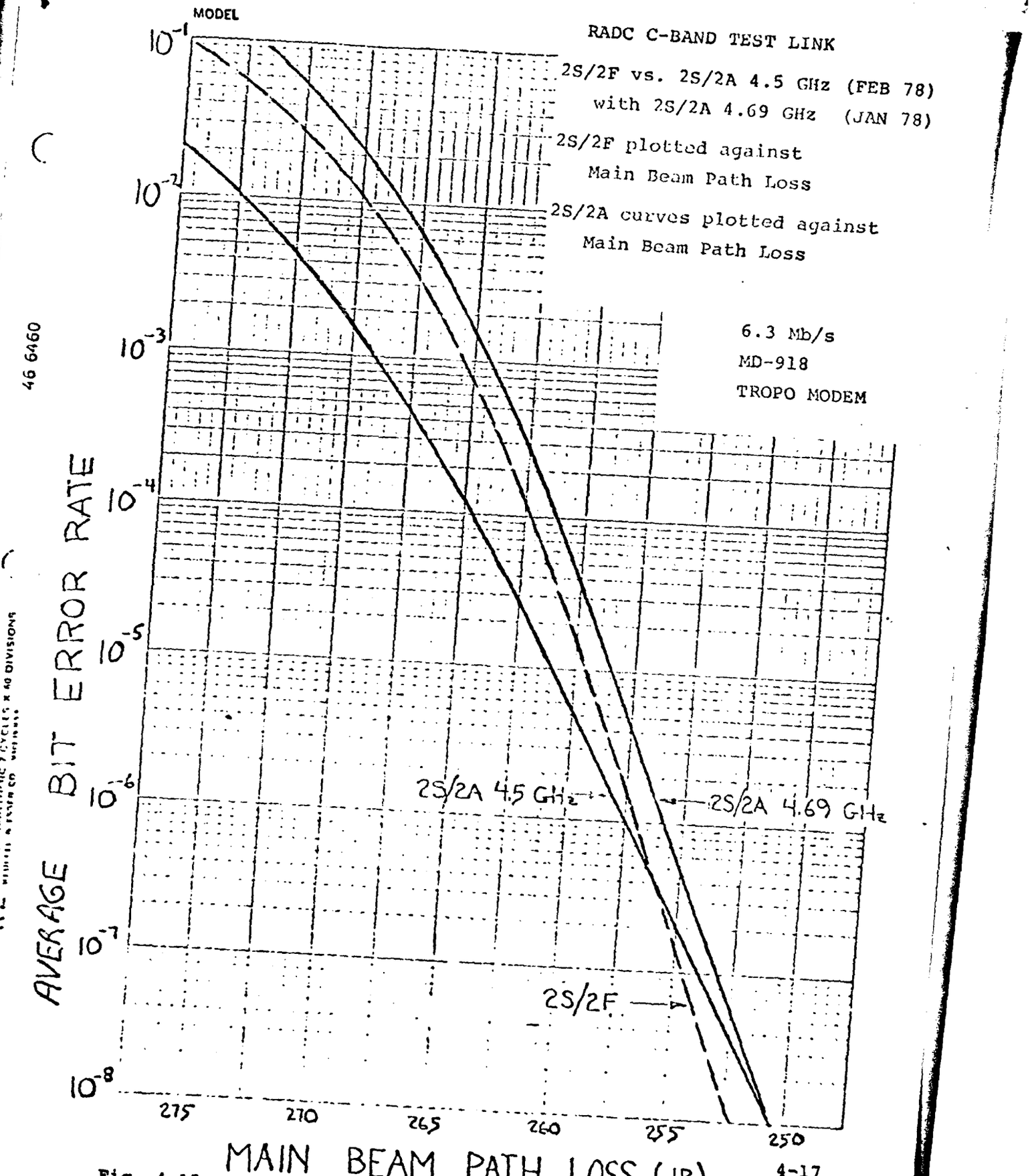


Fig. 4.15 Quad Diversity Configurations Plotted Against Main Beam Path Loss

4.3 Additional Tests

1. Three days continuous data.

This consisted of channel data taken all day for three consecutive days. The dates were March 28, 29 and 30, 1978. This data is included of the RSL and Correlation Coefficient Appendix.

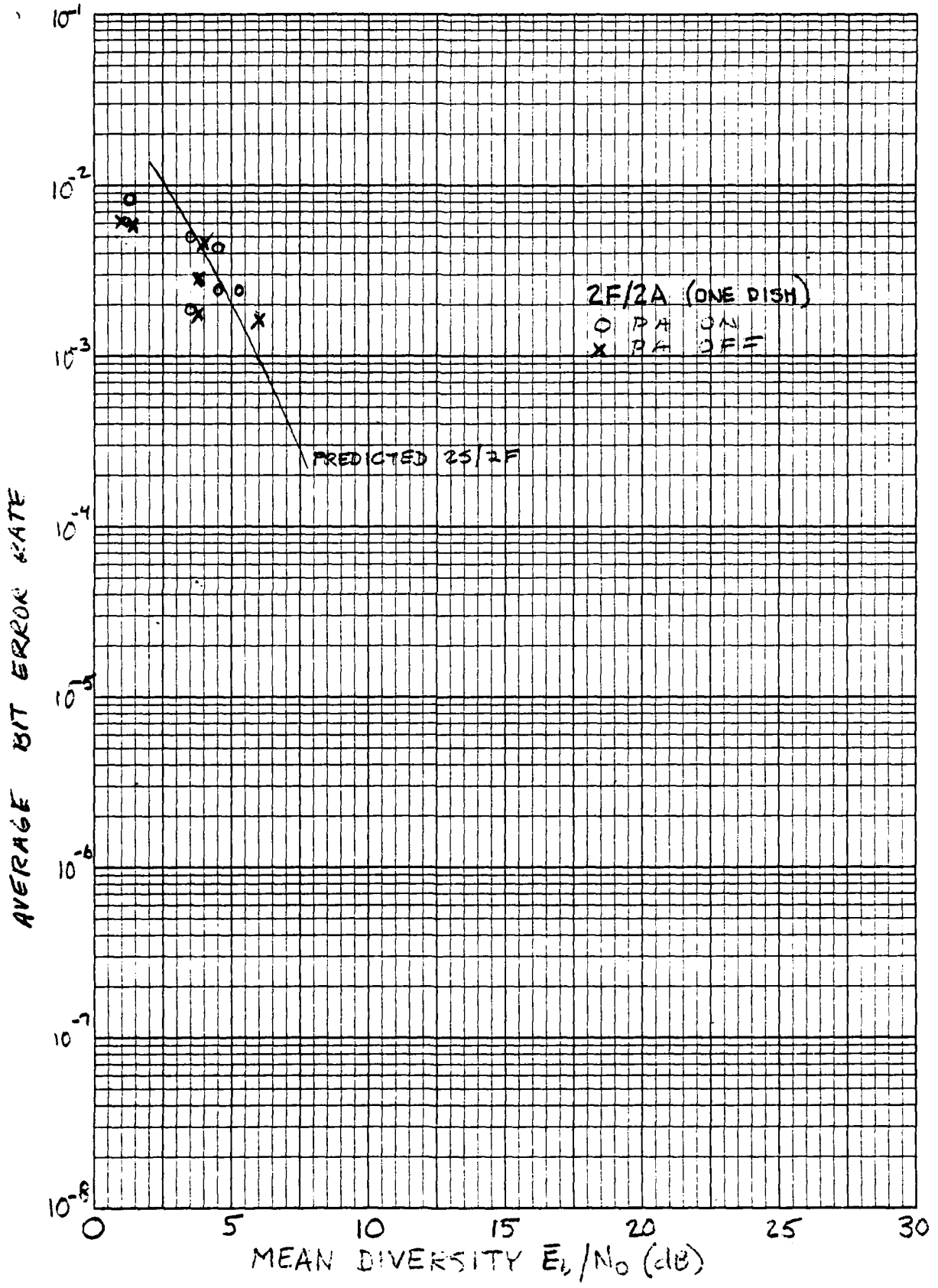
2. Co-located transmitter test.

This test consisted of firing up one of the Verona Power Amplifiers and taking alternate bit error rate measurements with the P.A. on and off. The results are shown in Figure 4.16. No degradation is visible.

3. Two P.A.'s on the same frequency.

For this test, Youngstown retuned one of the P.A.'s to 4690. Bit error rate measurements with (alternately) one P.A. and two P.A.'s were made. Figure 4.17 shows this data.

Fig. 4.16 Co-located Transmitter Tests



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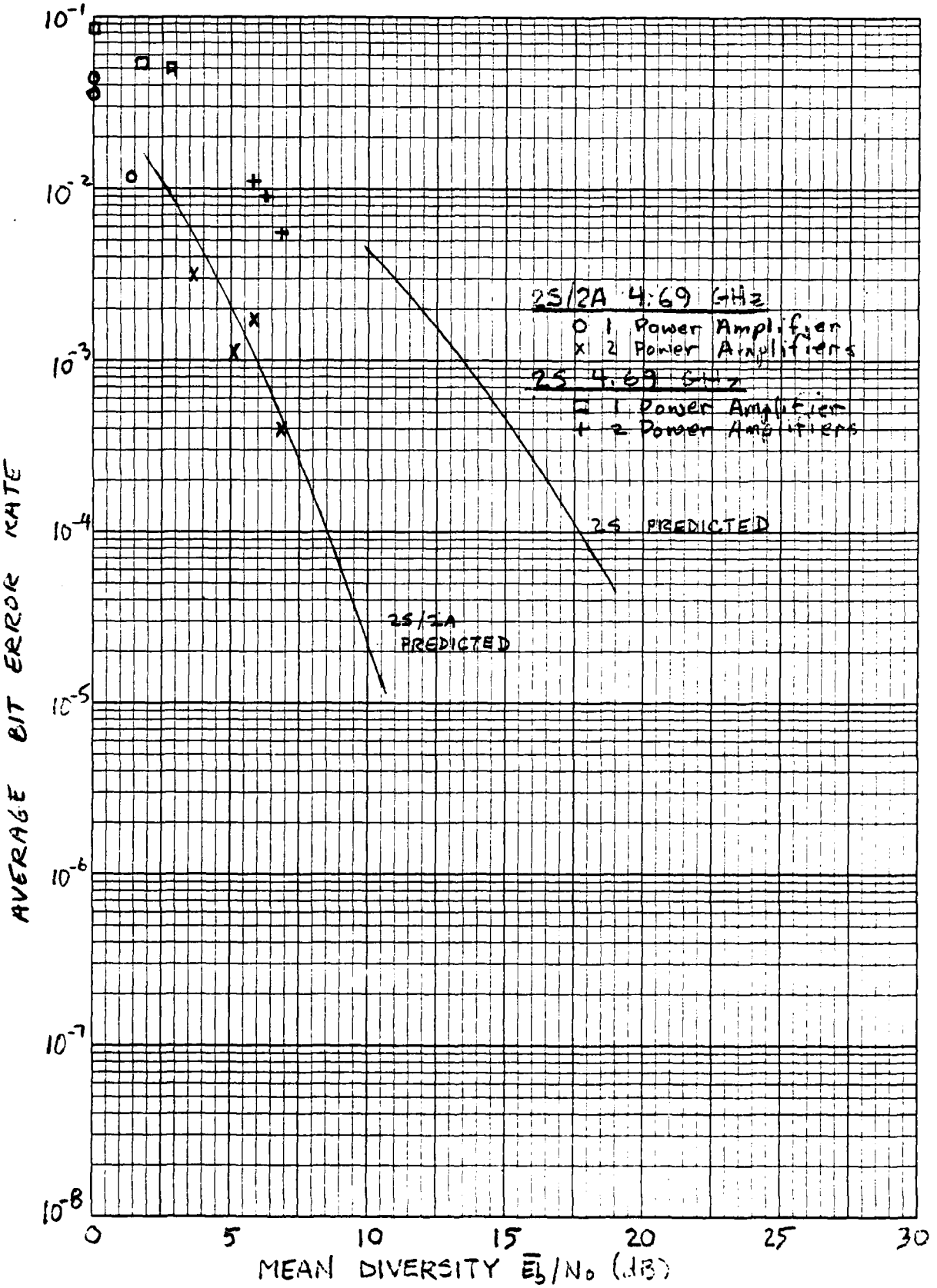
K·E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

Fig. 4.17 Two Transmit Power Amplifiers on Same Frequency



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K•E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.

SECTION 5
DEGRADATION AT 12.6 Mb/sec

Change-over to 12.6 Mb/sec was executed in early March. Problems were immediately evident, as expected error rate performance was not obtained.

During March, the S139B Troposcatter Simulator (100 ns tap spacing) was available for checking modem performance. For a period of about one week at the end of March, the SIGNATRON operator could not get good performance. Personnel from Sylvania arrived at the end of March, and solved the problem. The Sylvania trip report appears in Appendix H.

During April, the tunnel diode amplifier bias voltage for all 8 receivers was adjusted for flat response across C-Band. (Figure 5.1 shows data for one of the tunnel diode amplifiers.) The receivers were also swept (Figure 5.2).

The test set-up of Figure 5.3 was used to pass a pulse through the receivers to look for delay distortion. The pulse was only slightly smeared (this is a subjective judgement).

Delay from receiver input to shelter cable ends was measured for the 8 receivers with the set-up of Figure 5.4. The delays were within 50 n sec of each other.

Numerous tests to verify calibration accurary were made. The LEL's were checked for response to broad and narrow-band signals.

The circulators were by-passed and tests on one frequency run. Loss in the waveguide was measured. The tunnel diode amplifiers in the receivers were bypassed (resulting

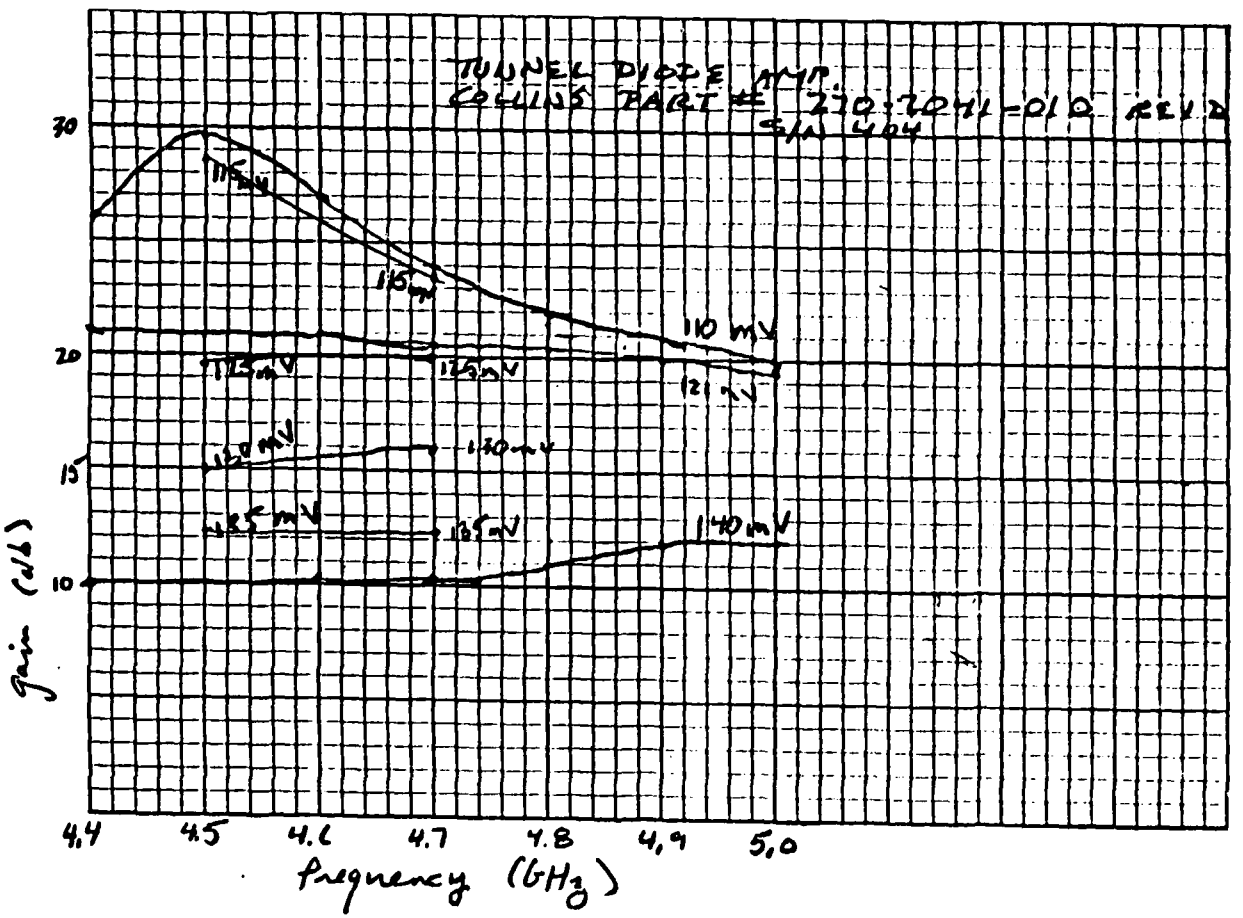

Fig. 5.1 Tunnel Diode Amplifier Frequency Response for Various Bias Voltages

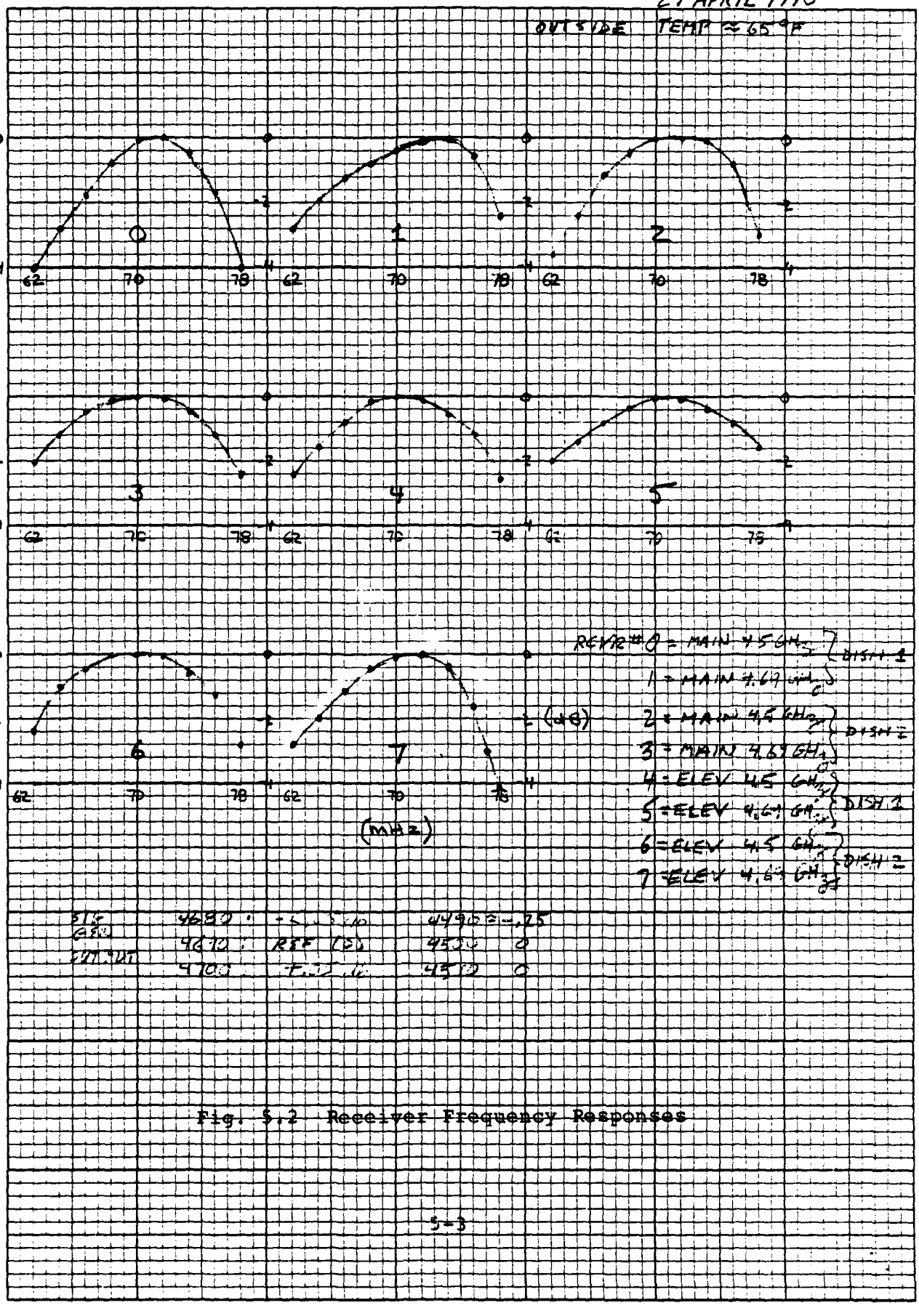

Fig. 5.2 Receiver Frequency Responses

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K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

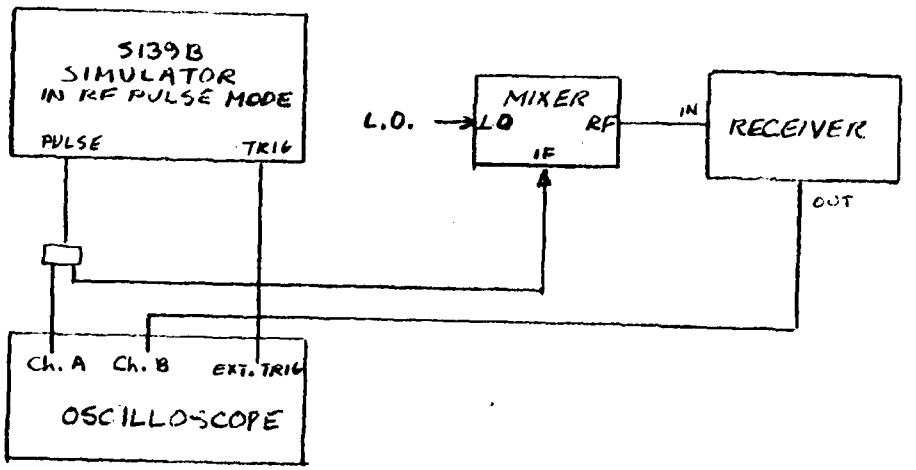

Fig. 5.3 Pulse Dispersion Test Set-up

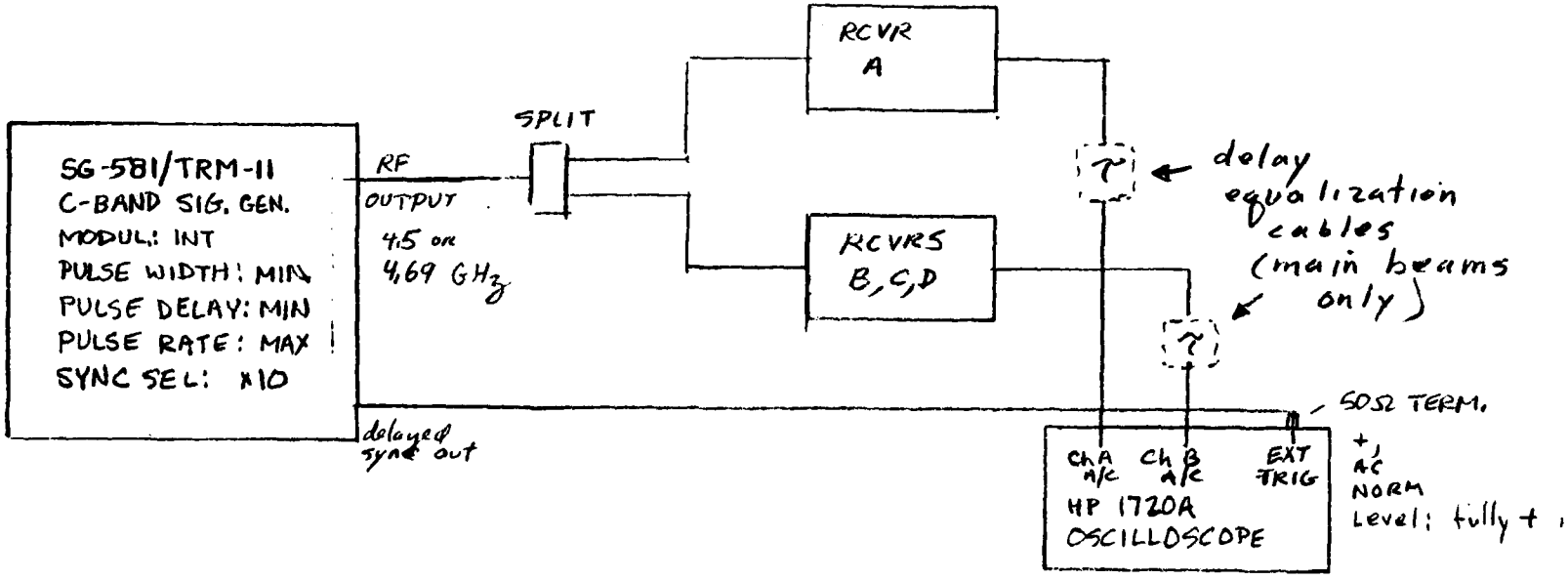

Fig. 5.4 Delay Test Set-up

in ≈ 11 dB noise figures). None of these steps alleviated the degradation.

In mid-May 1978 SIGNATRON and Sylvania personnel went to Youngstown to look for degradations at the transmit end. Reports by these personnel is included in Monthly Status Report #23, reproduced in Appendix I. The conclusion of these personnel is that the degradation did not originate at the transmit end, although full power tests could not be run, and inter-symbol interference at full power may exist.

Figures 5.5, 5.6 and 5.7 shows the 12 Mb/sec bit error rate data for various configurations for various time periods. 11 May was the conclusion of the trip to Youngstown.

At the end of the program, a high VSWR in the waveguide feed to one of the horns was measured. This was probably due to lack of pressurization and water leakage. The horn itself was removed and factory tested again, revealing no degraded parameters. Whether or not the high VSWR in the feed was present during the 12 Mb/sec bit error rate testing is not known. The current theories of the source of the source of the degradation are:

(1) Nonlinear ISI due to full power klystron.

(2) Horn leakage (between space and angle waveguide).

(3) High waveguide VSWR.

The high VSWR could have caused some coupling between the space and angle feeds, indicating that (2) and (3) together may have been the source of the degradation.

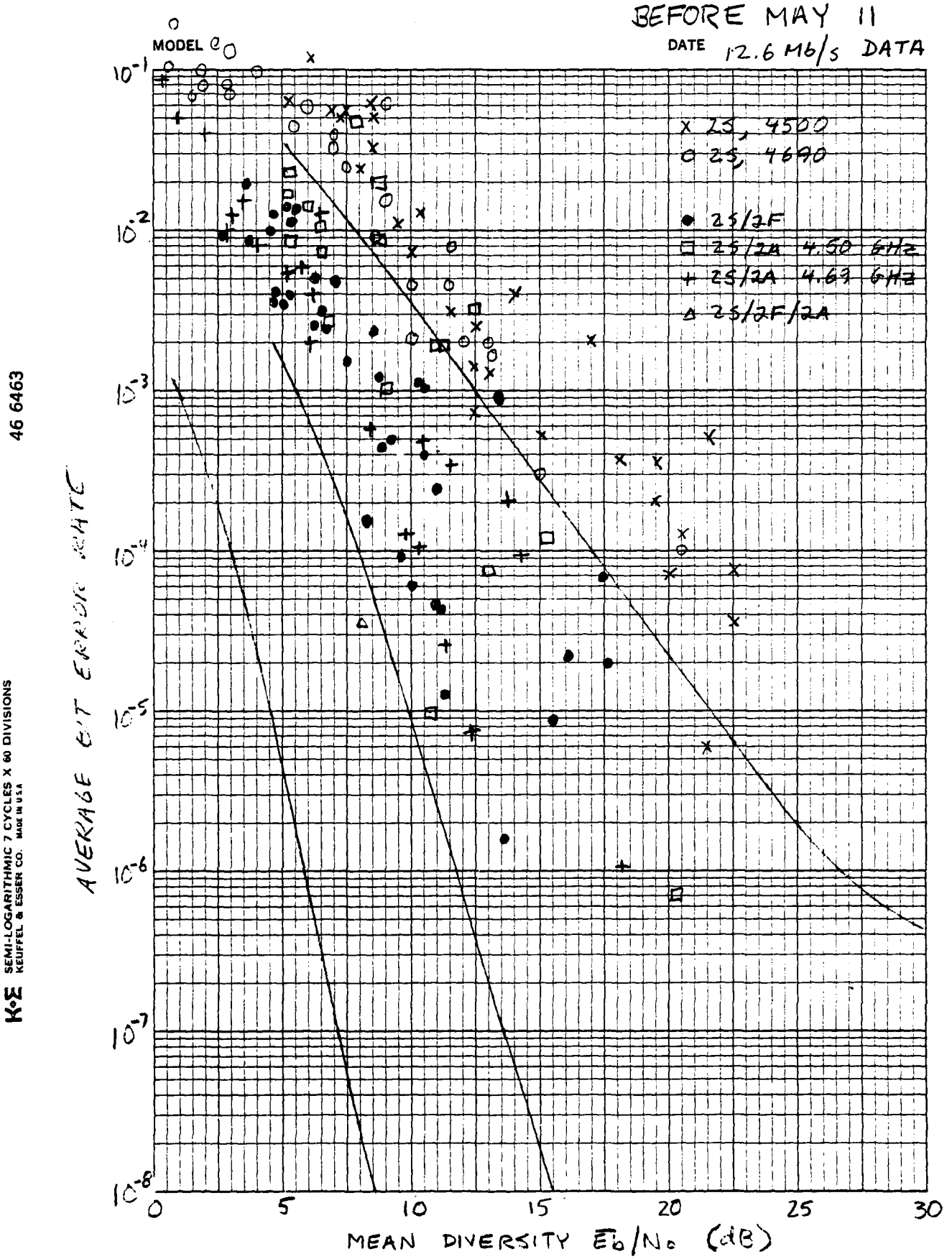

Fig. 5.5 12.6 Mb/s BER Data: Before 11 May

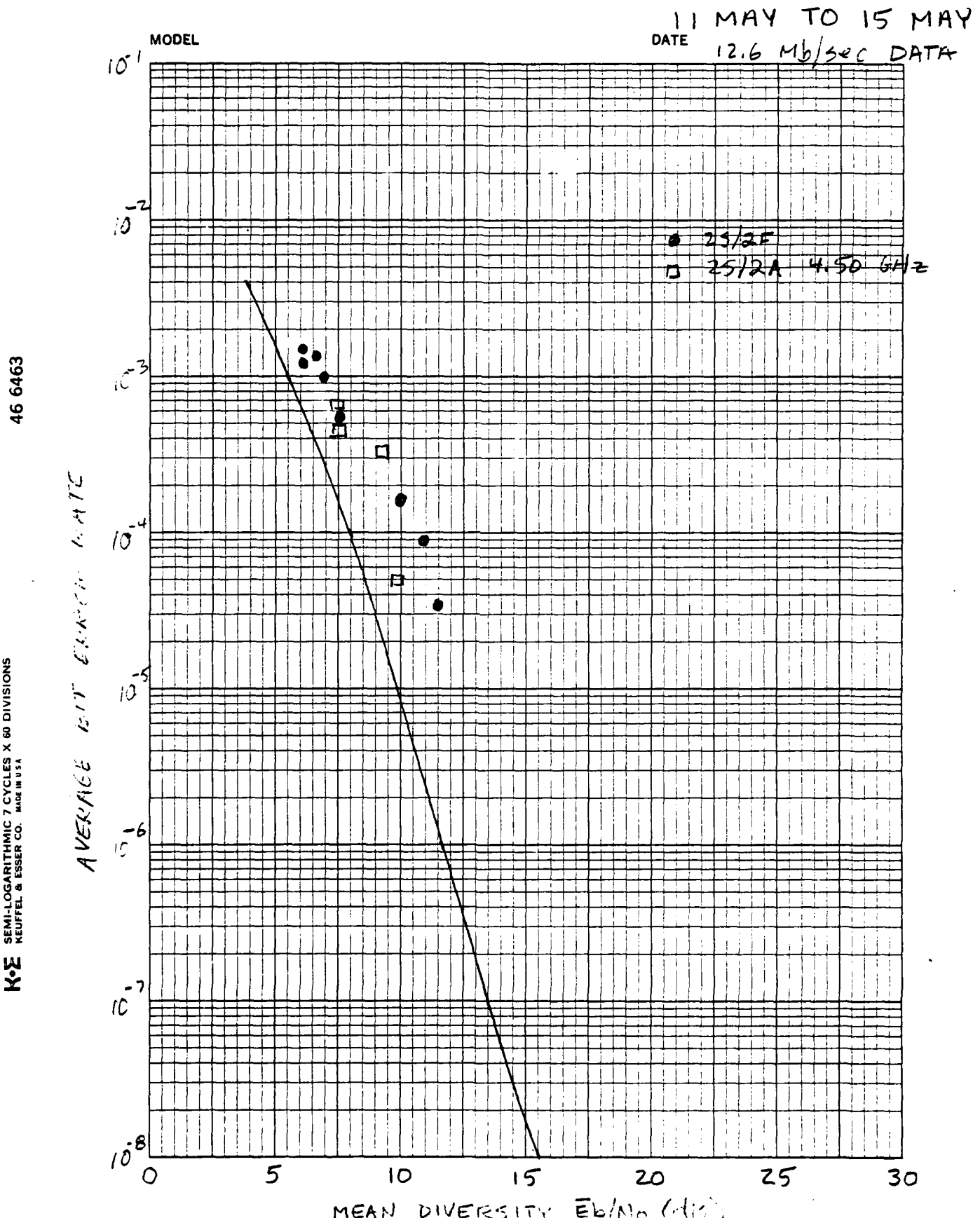

Fig. 5.6 12.6 Mb/s BER Data: 11 May to 15 May

AFTER 15 MAY

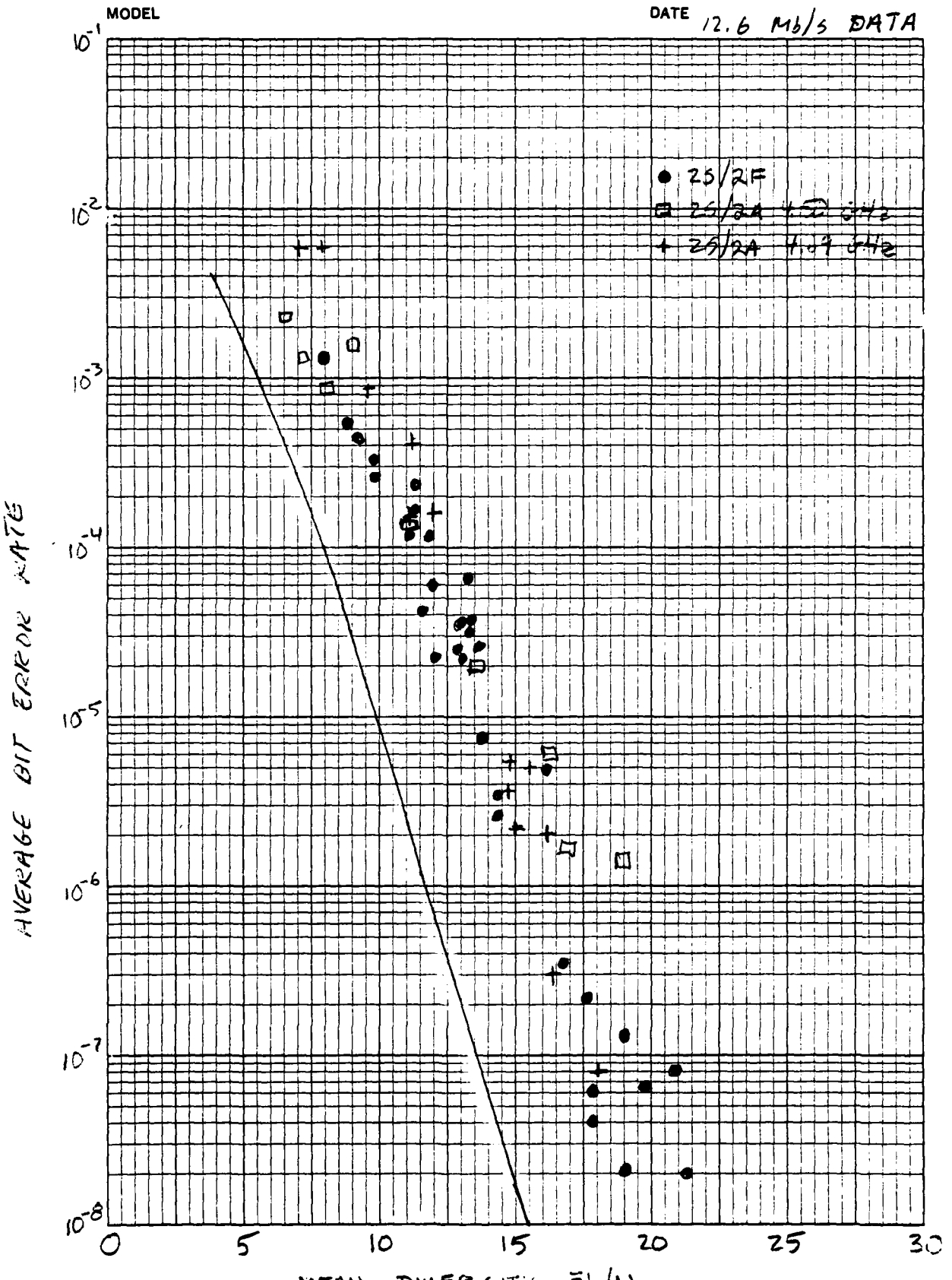

Fig. 5.7 12.6 Mb/s BER Data: After 15 May

APPENDIX A

FINAL TECHNICAL REPORT

DEVELOPMENT OF ANGLE DIVERSITY FEED SYSTEM ADAPTIVE ANTENNA CONTROL PROGRAM

R F Systems, Inc.

FINAL TECHNICAL REPORT

DEVELOPMENT OF ANGLE DIVERSITY FEED SYSTEM ADAPTIVE ANTENNA CONTROL PROGRAM

DAAB07-76-C-8085

Prepared By

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R F SYSTEMS, INC.
155 King Street
Cohasset, MA 02025

For

SIGNATRON, INC.
12 Harwell Avenue
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Under Purchase Order 000959
Line Item E.5

R F Systems S. O. 692

August 1977

I. INTRODUCTION

The subject Final Report summarizes the test results from the design, development and installation at the Verona, New York RADC test sites of an angle diversity feed system for the AN/TRA-39A Tropospheric Scatter Communications antennas. Included herein are pertinent data from the engineering development tests, factory tests of the final devices and test results and conclusions from the sequence of field tests.

Test procedures and the design plan for this program were previously submitted to Signatron, Inc. as part of Line Item E.6 and E.4, respectively. Please refer to these documents for background material.

II. CONCISE STATEMENT TECHNICAL REQUIREMENTS

The intent of the Antenna Feed Development Program was to design, install and test a special angle diversity feed suitable for use in the AN/TRA-39A troposcatter reflectors which would exhibit the following technical characteristics:

Frequency Range	4.4-5.0 GHz
Type	Dual aperture, high and low elevation beam
Polarization	Dual linear
Power Level	10 KW, CW
VSWR	1.3, max.
Crossover Level	3 to 4 dB nominal
Reflector Size	28 feet diameter
Reflector Focal Length	142.2 inches
Nominal Antenna Gain	49 dB at 4.4 GHz
Half-Power Beamwidth	0.6 degrees maximum
Loss of Gain in Lower Beam Compared to Existing Antenna	1 dB, maximum

III. SUMMARY OF RESULTS

The program has been successfully concluded and the test results detailed herein demonstrate that the angle diversity feed does meet the technical requirements summarized above.

IV. FINAL FEED DESIGN

Figures 1-3 show photographs of the final angle diversity feed. The physical design utilizes two dual-mode, two-port feeds arranged one above the other. The vertical spacing is 1.85 inches, center-to-center. Each aperture is 1.600 inches square.

Close spacing of simple square radiating apertures does not result in useable primary feed patterns; therefore, compensating devices near the aperture are required. In the present example these devices take the form of a slow-wave structure consisting of a set of metal fins or corrugations adjacent to the aperture edge. These are supported by a circular metal plate.

In addition, a pair of U-shaped metal straps are added to further shape the primary pattern. The corrugations and the straps reduce the current density outside the aperture, thereby reducing the excessive amplitude ripple and improving the symmetry and reducing the spillover of the patterns.

Tuning screws are added to the feeds and are located just inside each aperture. They improve the VSWR and reduce the coupling from one aperture to the other. Four screws are used per aperture; they are located at different distances from the aperture to optimize the isolation for the two different polarizations.

The four ports on the feed are designated S_h, S_v, A_v and A_h, respectively, from the top to the bottom of the feed. (The A_v and A_h ports are the ones with the integral waveguide bends attached.)

The feed is constructed of aluminum alloy; the fabricated circular plate and fins are dip brazed to investment cast horns with formed waveguide sections attached.

A radome constructed of epoxy fiberglass laminate is added to seal the aperture. It is a thin wall spherical shell, and the entire assembly is pressure tight to 5 psig pressure. Input waveguide flanges are standard UG-507/U cover flanges.

The development of the feed also required that a new set of supporting struts be fabricated to replace existing struts on the AN/TRA-39A antenna. These were fabricated of aluminum alloy and are pinned in place using existing attachment hardware.

IV. FINAL FEED DESIGN (Continued)

New WR187 waveguide was also supplied to replace the existing waveguide on the AN/TRA-39A reflector, and new waveguide was added for a third transmission line connecting additional microwave receivers located near the existing ones. Test data for these waveguides is included in this report.

Per instructions by Signatron personnel, this third waveguide run was connected to the A_v port. The A_h port was capped with a pressure-tight cover. The waveguide brackets on the lower spar are such, however, that this third waveguide may be attached to the A_h port instead by adjusting the bracket attachment hardware.

The assembly drawing of the final feed (R F Systems #843253) is shown in Figure 68.

V. DISCUSSION OF TEST RESULTS - FACTORY AND DEVELOPMENT TESTS

(a) Feed VSWR

Figures 4-11 show measured swept frequency VSWR measurements of the feed. The data is taken over the 4.4-5.0 GHz frequency range and for all four ports of the two serial numbered feeds. The tabulation of results in Figure 36 shows that the maximum VSWR did not exceed 1.24, thus meeting the requirement for a maximum 1.3 VSWR.

(b) Feed Isolation

Figures 12-23 show the measured swept frequency isolation (coupling) measurements of the feed. This data was swept over the 4.4-5.0 GHz frequency for all combinations of ports. The tabulation of results in Figure 36 shows that the minimum isolation was 19.4 dB for the vertical-vertical ports (A_v-S_v) and 19.5 dB for the horizontal-horizontal ports (A_h-S_h). The remaining ports were all orthogonally polarized and hence exhibited much better isolations (typically better than 35 dB).

The development effort had as one of its tasks the improvement of the vertical-vertical and horizontal-horizontal isolation. It is believed that the values of approximately 20 dB for these ports represent the best attainable results for such a relatively simple four-port angle diversity feed operating over a broad frequency band. In many strategic troposcatter communications systems, however, the frequencies of operation are well established at each site, and tuning the antennas for optimum VSWR and isolation is logistically possible. In this case, the achievable isolation in a relatively narrow operating frequency band (e.g. 50 MHz or 1%) can be as much as 30 dB for the vertical-vertical and horizontal-horizontal ports.

V. DISCUSSION OF TEST RESULTS (Continued)

(c) Primary Feed Patterns

Measured primary feed patterns are shown in Figures 24-35. They were measured at 4.4, 4.7 and 5.0 GHz in the elevation and azimuth planes and for vertical and horizontal polarizations. The pattern summary shown in Figure 36 tabulates the measured reflector edge intensities (including 2.9 dB of "space" attenuation to take into account the longer path length to the edge of the AN/TRA-39A reflector).

The summary shows that the measured edge intensities lie within the range for optimum antenna gain and low sidelobes. Figure 64, "Characteristics of Circular Apertures", demonstrates this. In addition, the lack of significant amplitude ripple on the patterns shows that the illumination of the antenna will be adequate.

(d) Primary Feed Phase Center Measurements

The angle diversity feed was set up on a short antenna test range in such a way that the feed could be translated in three axes about the center of rotation of the antenna positioner. A phase bridge consisting of a local oscillator, two mixers and a Hewlett-Packard Vector Voltmeter was established to measure the relative phase of the signal received by the feed. This phase information was recorded on an X-Y recorder as a function of the angle to the feed. The feed was then translated so as to minimize the deviation from a uniform phase envelope when the feed was rotated through a total of $\pm$65 degrees. The position of the feed in relation to the center of rotation was then noted; this is the phase center of the feed. This measurement was done in the elevation and azimuth planes and for vertical and horizontal polarizations for 4.4, 4.7 and 5.0 GHz frequencies.

Figure 37 summarizes the phase center data. It shows that the phase is located at the horizontal (x) centerline, as expected. The phase center position in the longitudinal (z) direction varies with polarization and frequency. The variation amounts to +0.5" to -0.4". This variation will result in a quadratic phase error across the aperture of the reflector, which will cause a slight loss in antenna gain.

The magnitude of this loss can be estimated by the use of Figure 12.6 in Silver's "Microwave Antenna Theory and Design" (McGraw Hill, 1949), which computes the gain loss of a circular paraboloid when the feed is translated along the axis. Assuming that the feed is positioned so that the maximum excursion of the phase center is $\pm$0.45" about the focus, the resulting phase error (at 5 GHz) is $0.45/\lambda$ (1-cos 61°), where 61° is the edge angle of the reflector. This value is 0.098 wavelengths. Figure 12.6 shows that the expected loss in gain due to this feed phase center movement is 0.18 dB.

Of special interest is the phase center position in the vertical direction (y), since this position determines the crossover level and angular spacing of the lower and upper secondary beams.

Measurements show that, for horizontal polarization, the phase center lies close to the center of the square horn aperture. However, for vertical polarization the phase center is displaced a slight distance away from the center of the horn aperture. This effect is due to the relatively tight coupling of the local fields at the common metal wall for this polarization. The horn centers are physically 1.85" apart, and the horizontally polarized phase center is 1.84" apart, while the vertically polarized phase center is 2.06" apart. Later discussion will calculate the effects on the angular spacing of the secondary beams.

(e) VSWR of Waveguide Components

All waveguide components (straight and flexible sections) were checked out for VSWR by sweeping in frequency across the 4.4-5.0 GHz band and plotting the return loss. Figure 38 summarizes the maximum VSWR of each component supplied as part of the feed system. The maximum peak VSWR was 1.07, and the median peak VSWR was 1.04.

VI. DISCUSSION OF TEST RESULTS - TESTS AT VERONA, NEW YORK

The original plan for verifying the performance of the angle diversity feed in the AN/TRA-39A reflectors was described in the Test Plan. The initial test setup utilized an RADC tower for the transmitting source located about one mile from the tropo installation. Initial measurements using this tower, however, showed that the intervening high tree line was causing severe fluctuations in the received signal. Accordingly, a substitute transmitting site was implemented in a corn field about 3500 feet from the tropo installation. This setup is shown in Figure 39.

VI. DISCUSSION OF TEST RESULTS (Continued)

A six-foot diameter transmitting antenna was installed on a pickup truck and aimed at the test antennas. The receiving equipment consisted of a calibrated microwave instrumentation receiver and a display meter. Angular rotations of the antennas were measured by a 5 minute accuracy transit affixed to the hub of each reflector and arranged so as to sight a target on a nearby antenna pedestal.

Before starting the test sequence, the transits were carefully levelled and their scales were locked. The initial angles to the target were noted for future reference as a means of re-aiming the antennas to the Great Circle azimuth and to the elevation angle of the existing units.

Starting with the right-hand antenna, a series of four radiation patterns were plotted at a frequency of 4.7 GHz. These patterns were examined to determine the correlation between the results and the expected radiation patterns described in the Technical Manual for these antennas. The right antenna patterns are shown in Figures 40-43. They indeed indicate that the half-power beamwidth and sidelobes conform closely to the expected values. This measurement also developed confidence in the quality of the 3500 foot test range.

The original AN/TRA-39A feeds were then removed and replaced with the new angle diversity feeds without disturbing the settings of the instrumentation receiver. A set of patterns (Figures 44-52) for all four ports and for both vertical and horizontal planes was then measured and the peak gain levels noted.

This entire sequence was repeated on another day for the left-hand antenna. Refer to Figures 53-63.

The Table of Figure 65 summarizes the test results for the angle diversity feeds. Included in this table is a summary of the calculated parameters resulting from the measured primary patterns and from the phase center data previously recorded. The calculated parameters were taken from the curves in Figure 64. It can be seen from a comparison of the 4.7 GHz data that the half-power beamwidths correlate well with the expected values, keeping in mind the 5 minute accuracy of the transits.

VI. DISCUSSION OF TEST RESULTS (Continued)

The first sidelobe levels are somewhat higher than calculated, although quite satisfactory for troposcatter application. The worse measured sidelobe level was -21 dB for the on-axis feed. The worst computed sidelobe was -23.5 dB. The discrepancy is undoubtedly due to a combination of slight errors in the test range and other effects, such as reflector surface tolerances and feed and feed support member aperture blockage. Neither of these latter effects were allowed for in the theoretical calculations. Since the reflector surface tolerance is not known, no estimate can be made here of this effect.

The sidelobe degradation due to the aperture blockage can be computed roughly. Assuming an 8" diameter feed, a pair of 2" diameter spars and the 2" wide waveguide run, the sidelobe degradation would amount to about 2.6 dB. This is in the order of magnitude of the degradation experienced in the field tests.

The relative beam positions in the elevation plane were examined and summarized in Figure 66. The expected shift from lower to upper beam is different for vertical and horizontal polarizations in keeping with the variation in phase center position previously measured. The expected values are 39' and 44', respectively. The measured beam shift average is 36' and 42.5', respectively. It is felt that this agreement is satisfactory in view of the 5' accuracy of the transit.

The crossover levels resulting from the intersection of the two beams in the elevation plane are summarized in Figure 67. The calculated crossover levels are 4.0 and 5.7 dB for vertical and horizontal polarization, respectively, and the measurements show that they averaged 3.4 and 5.5 dB, respectively. Again, the agreement is felt to be satisfactory.

Accurate record was kept of the received signal level at the peak of the beam during the course of the measurements. A signal monitor was employed at the transmitting site to detect variations in transmitting power during the period of measurement.

Figure 67 summarizes the difference in gain for the elevated and lower beams for the right and left antennas and for both vertical and horizontal polarizations as compared to the gain of the original AN/TRA-39A antenna.

VI. DISCUSSION OF TEST RESULTS (Continued)

The average of the gain differences for the lower beam compared to the original is -0.3 dB. The averages of the gain differences for all beams compared to the original is -0.15 dB.

The conclusion is that the measured gain differences resulting from the installation of the new angle diversity feed did not exceed the specification limit of 1 dB. More probably, the actual gain is unchanged in view of the estimated measurement accuracy of $\pm$0.5 dB.

Following the radiation pattern tests, the antennas were reset to the original Great Circle azimuths and to the original elevation angles using the transits. The transits were left fixed to the reflectors for future use and were left locked to the original reference positions.

Figure 67 tabulates these reference angles so that, if necessary, the antennas can be re-aimed at a future date.

VII. APPLICATION OF ANGLE DIVERSITY FEED TO OTHER ANTENNAS

In light of the successful design procedure and verification of the 4.4-5.0 GHz feed in the 28 foot diameter reflector, an examination of the feasibility of modifying other tropo reflectors may be productive. Also, the feasibility of accomplishing this in different frequency bands is of interest.

The present feedhorn is designed for illumination of a circularly symmetrical paraboloid having an f/D ratio of 0.42. It can be applied without modification to other reflectors if they have f/D ratios in the range of 0.40 to 0.45. This will preserve the present edge intensities within a tolerance of $\pm$1 dB and will have a minor effect on far field gain, beamwidth sidelobe levels and crossover levels.

There is a minimum reflector diameter below which the relatively large size of the angle diversity feed presents problems with aperture blockage. To evaluate this, an estimate is made of the size of the feed in various frequency bands by scaling the existing feed. Then an estimate is made of the sizes of the support spars for the feed and the sizes of the waveguide or coaxial transmission line which will be required to carry the RF signal. A criteria is decided upon to limit the total permissible aperture blockage. This criteria is taken to be the requirement for a maximum sidelobe level of -20 dB.

VII. APPLICATION OF ANGLE DIVERSITY FEED TO OTHER ANTENNAS (Continued)

The calculations on Table VII summarize these results. In the lower tropo frequency band, coaxial transmission line is used with waveguide employed in the higher microwave bands.

The conclusions are that the present angle diversity feed will be suitable for reflector diameters down to about 45 feed in the 755-985 MHz frequency band if coaxial line is used as a feeder.

There is no further restriction on the application of this feed other than to limit the CW power incident to the unit to those values estimated in Table VII.

Most existing tropo antennas will require that the feed support assembly be modified, sometimes extensively, to accommodate the new feed. In many instances (such as the AN/TRA-39A), complete replacement of the feed support assembly may be the most effective method.

Table VIII tabulates the expected radiation pattern parameters for a variety of combinations of likely troposcatter antenna size and frequency combinations when equipped with the angle diversity feed.

APPENDIX I

APPENDIX I

ILLUSTRATIONS

FIGURE NUMBER	TITLE
1	Photo 17194-4 - Angle Diversity Feed
2	Photo 17194-1 - Angle Diversity Feed
3	Photo 17194-3 - Angle Diversity Feed
4	Measured Feed VSWR - Feed No. 1 - SV Port
5	" - SH Port
6	" - AV Port
7	" - AH Port
8	Measured Feed VSWR - Feed No. 2 - SV Port
9	" - SH Port
10	" - AV Port
11	" - AH Port
12	Measured Feed Isolation - Feed No. 1 - AH-SH Ports
13	" - AV-SV Ports
14	" - AH-AV Ports
15	" - SH-SV Ports
16	" - AV-SH Ports
17	" - SV-AH Ports
18	Measured Feed Isolation - Feed No. 2 - AH-SH Ports
19	" - AV-SV Ports
20	" - AH-AV Ports
21	" - SH-SV Ports
22	" - AV-SH Ports
23	" - SV-AH Ports

APPENDIX I

ILLUSTRATIONS (continued)

FIGURE NUMBER	TITLE
24	Measured Primary Pattern - 4400 MHz, Vertical Polarization, Elevation Plane
25	" " " - 4400 MHz, Vertical Polarization, Azimuth Plane
26	" " " - 4400 MHz, Horizontal Polarization, Elevation Plane
27	" " " - 4400 MHz, Horizontal Polarization, Azimuth Plane
28	" " " - 4700 MHz, Vertical Polarization, Elevation Plane
29	" " " - 4700 MHz, Vertical Polarization, Azimuth Plane
30	" " " - 4700 MHz, Horizontal Polarization, Elevation Plane
31	" " " - 4700 MHz, Horizontal Polarization, Azimuth Plane
32	" " " - 5000 MHz, Vertical Polarization, Elevation Plane
33	" " " - 5000 MHz, Vertical Polarization, Azimuth Plane
34	" " " - 5000 MHz, Horizontal Polarization, Elevation Plane
35	" " " - 5000 MHz, Horizontal Polarization, Azimuth Plane
36	Table I, Measured Feed VSWR, Isolation, Primary Pattern Summary
37	Table III, Phase Center Measurements
38	Table II, Measured Peak VSWR - Waveguide Components
39	Antenna Pattern Test Setup

APPENDIX I

ILLUSTRATIONS (continued)

FIGURE NUMBER	TITLE
40	Measured Secondary Pattern - Right Antenna - Original Feed - Vertical Polarization, Elevation
41	Measured Secondary Pattern - Right Antenna - Original Feed - Horizontal Polarization, Elevation
42	Measured Secondary Pattern - Right Antenna - Original Feed - Vertical Polarization, Azimuth
43	Measured Secondary Pattern - Right Antenna - Original Feed - Horizontal Polarization, Azimuth
44	Measured Secondary Pattern - Right Antenna - New Feed - SV Azimuth
45	Measured Secondary Pattern - Right Antenna - New Feed - SH Azimuth
46	Measured Secondary Pattern - Right Antenna - New Feed - AH Azimuth
47	Measured Secondary Pattern - Right Antenna - New Feed - AV Azimuth
48	Measured Secondary Pattern - Right Antenna - New Feed - AH Elevation
49	Measured Secondary Pattern - Right Antenna - New Feed - SH Elevation
50	Measured Secondary Pattern - Right Antenna - New Feed - AV Elevation
51	Measured Secondary Pattern - Right Antenna - New Feed - SV Elevation
52	Measured Secondary Pattern - Left Antenna - Original Feed - Vertical Polarization, Elevation
53	Measured Secondary Pattern - Left Antenna - Original Feed - Horizontal Polarization, Elevation
54	Measured Secondary Pattern - Left Antenna - Original Feed - Vertical Polarization, Azimuth

APPENDIX I

ILLUSTRATIONS (continued)

FIGURE NUMBER	TITLE
55	Measured Secondary Pattern - Left Antenna - Original Feed - Horizontal Polarization, Azimuth
56	Measured Secondary Pattern - Left Antenna - New Feed - SV Azimuth
57	Measured Secondary Pattern - Left Antenna - New Feed - SH Azimuth
58	Measured Secondary Pattern - Left Antenna - New Feed - AH Azimuth
59	Measured Secondary Pattern - Left Antenna - New Feed - AV Azimuth
60	Measured Secondary Pattern - Left Antenna - New Feed - AH Elevation
61	Measured Secondary Pattern - Left Antenna - New Feed - SH Elevation
62	Measured Secondary Pattern - Left Antenna - New Feed - AV Elevation
63	Measured Secondary Pattern - Left Antenna - New Feed - SV Elevation
64	Circular Aperture Characteristics
65	Table IV - Calculated & Measured Pattern Characteristics - Summary
66	Table V - Relative Beam Positions
67	Table VI - Summary of Crossover Levels, Relative Gains & Transmit Setting Angles
68	Drawing 843253 - Angle Diversity Feed Brazing Assembly
69	Table VII - Calculation of Minimum Reflector Diameter for Criteria of 20 dB Sidelobes
70	Table VIII - Secondary Pattern Characteristics of Tropo Antennas with Angle Diversity Feeds

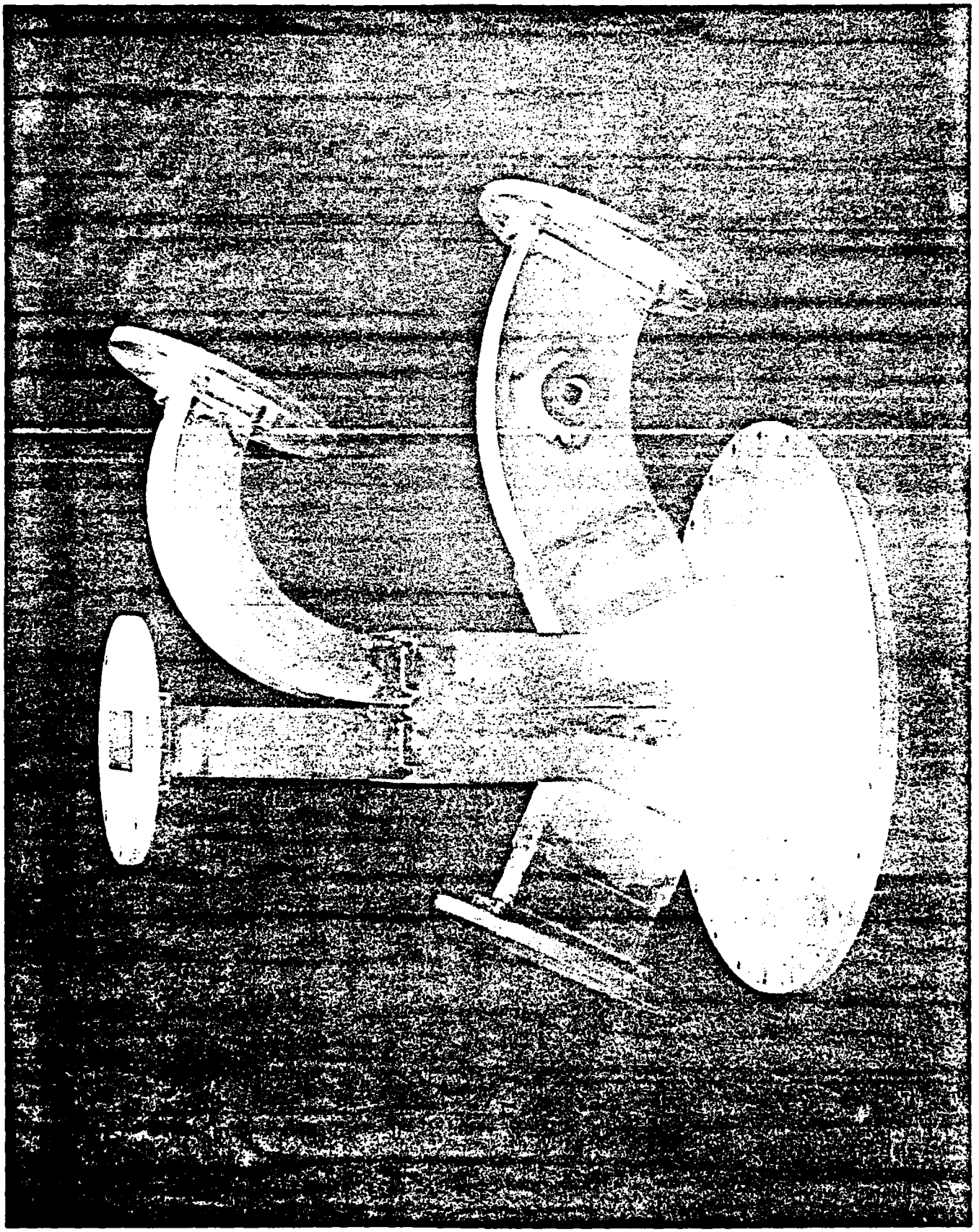


FIGURE 1 - ANGLE DIVERSITY FEED

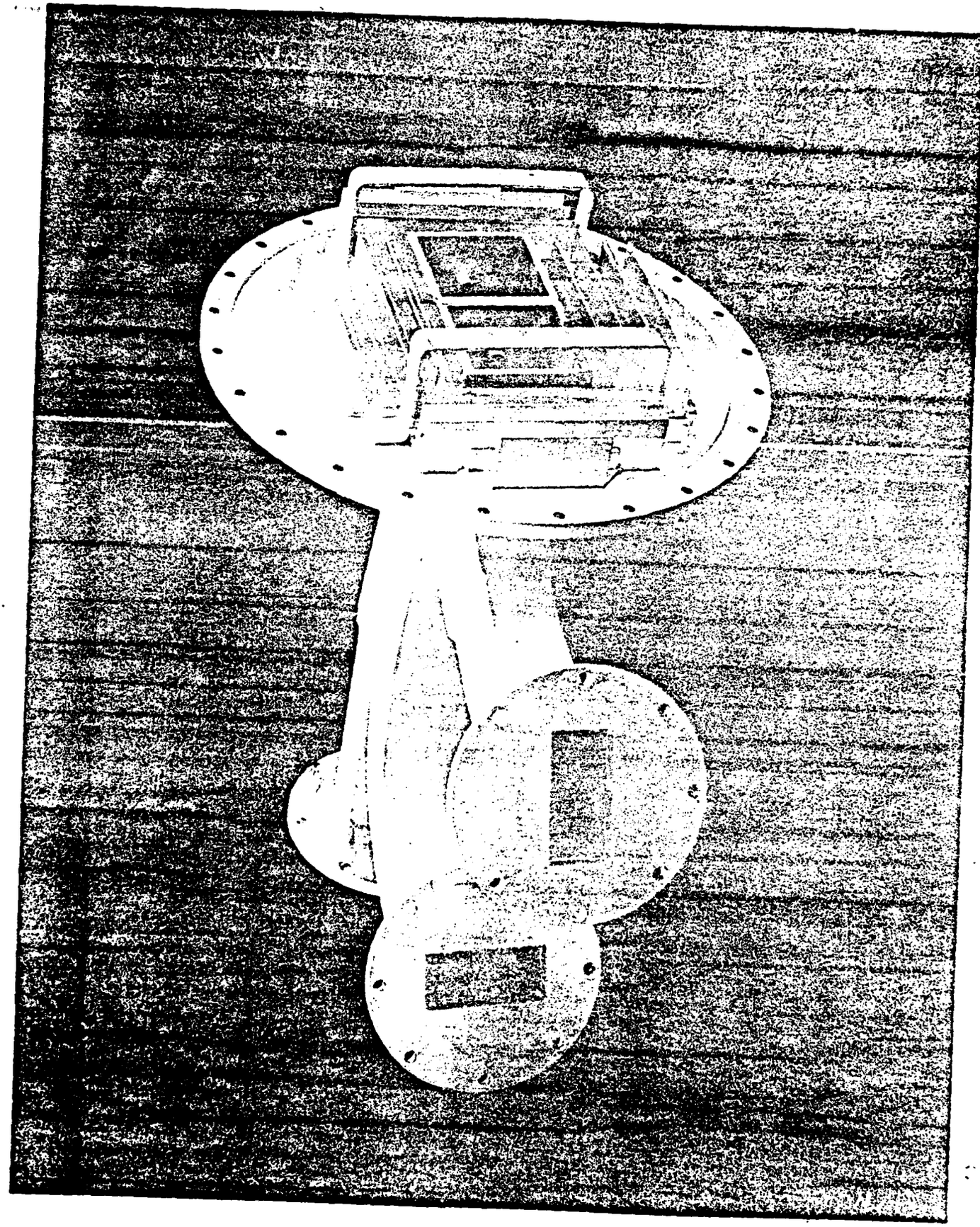


FIGURE 2 - ANGLE DIVERSITY FEED

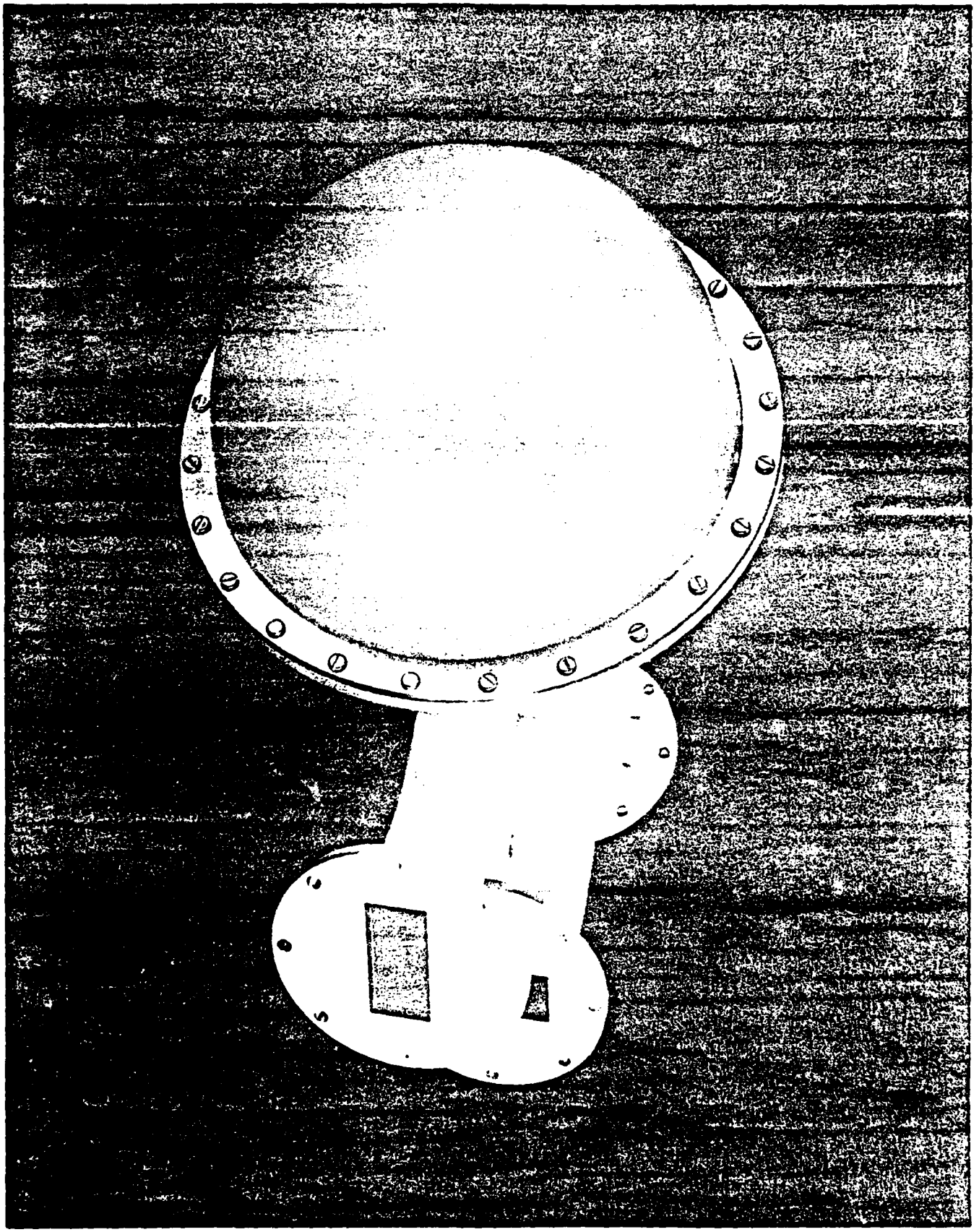


FIGURE 3 - ANGLE DIVERSITY FEED

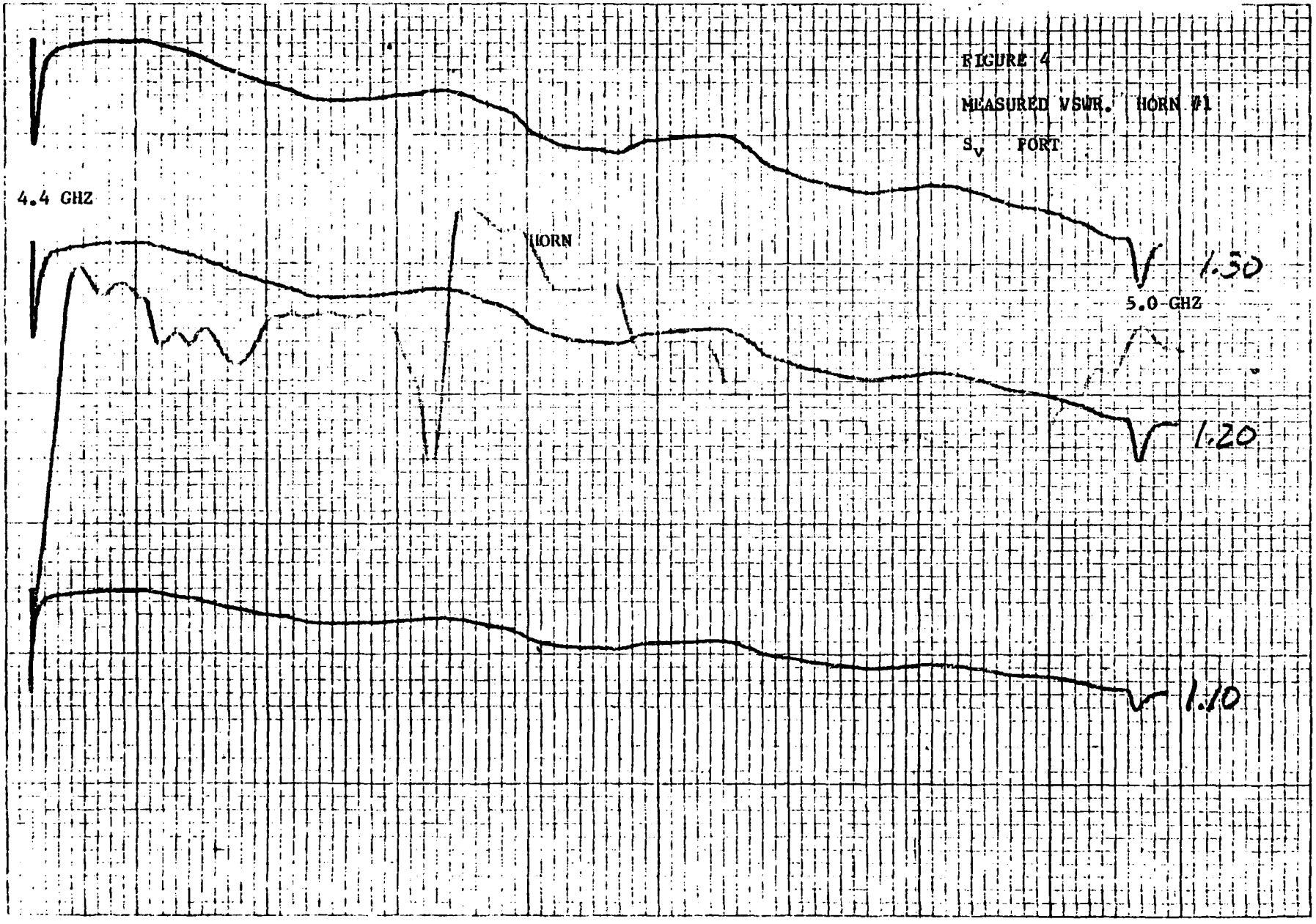


FIGURE 4
MEASURED VSWR. HORN #1
S_V PORT
4.4 GHZ
HORN
1.30
5.0 GHZ
1.20
1.10

FIGURE 4

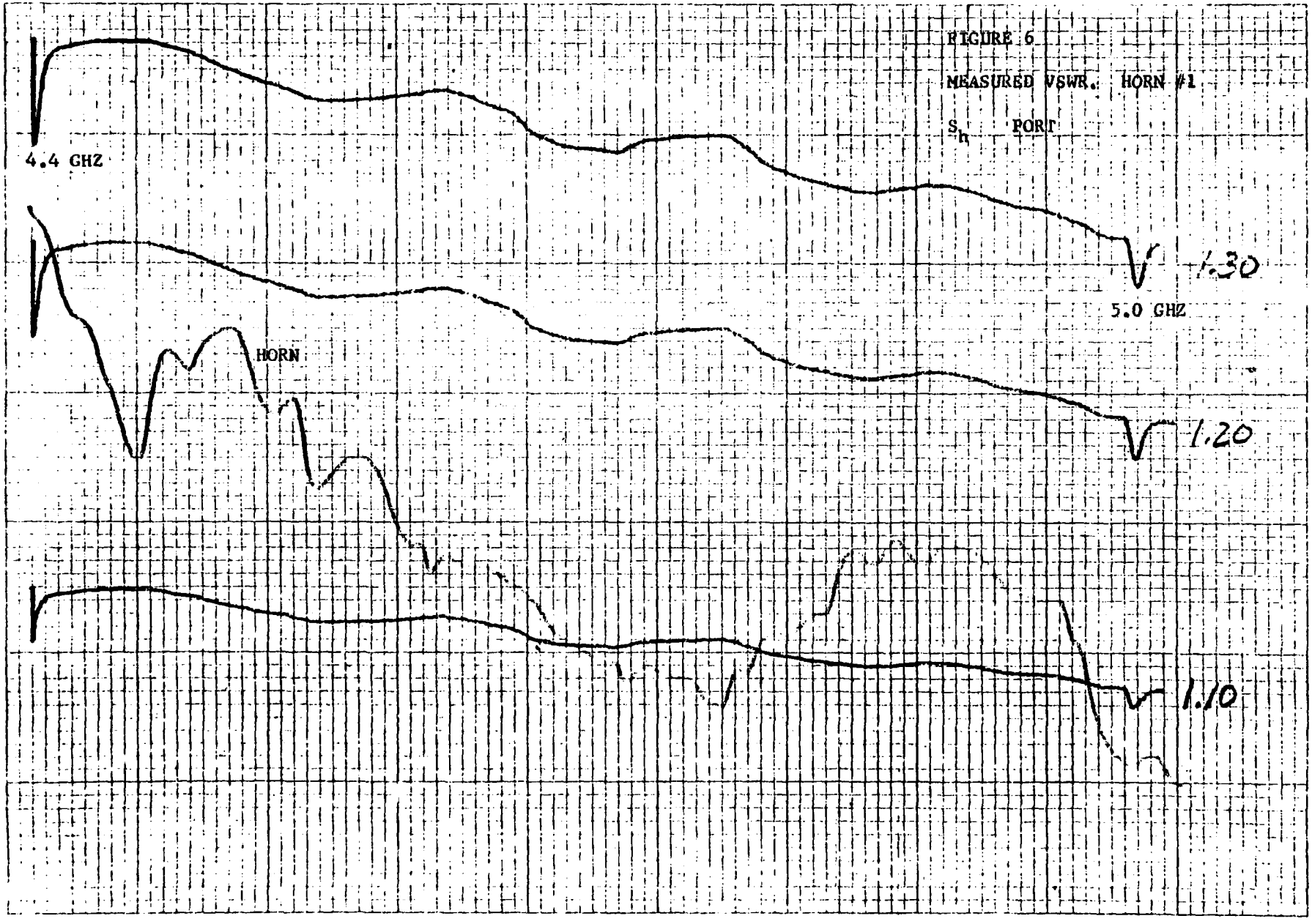


FIGURE 6
MEASURED VSWR. HORN #1
S_h PORT
4.4 GHZ
1.30
5.0 GHZ
HORN
1.20
1.10

FIGURE 5

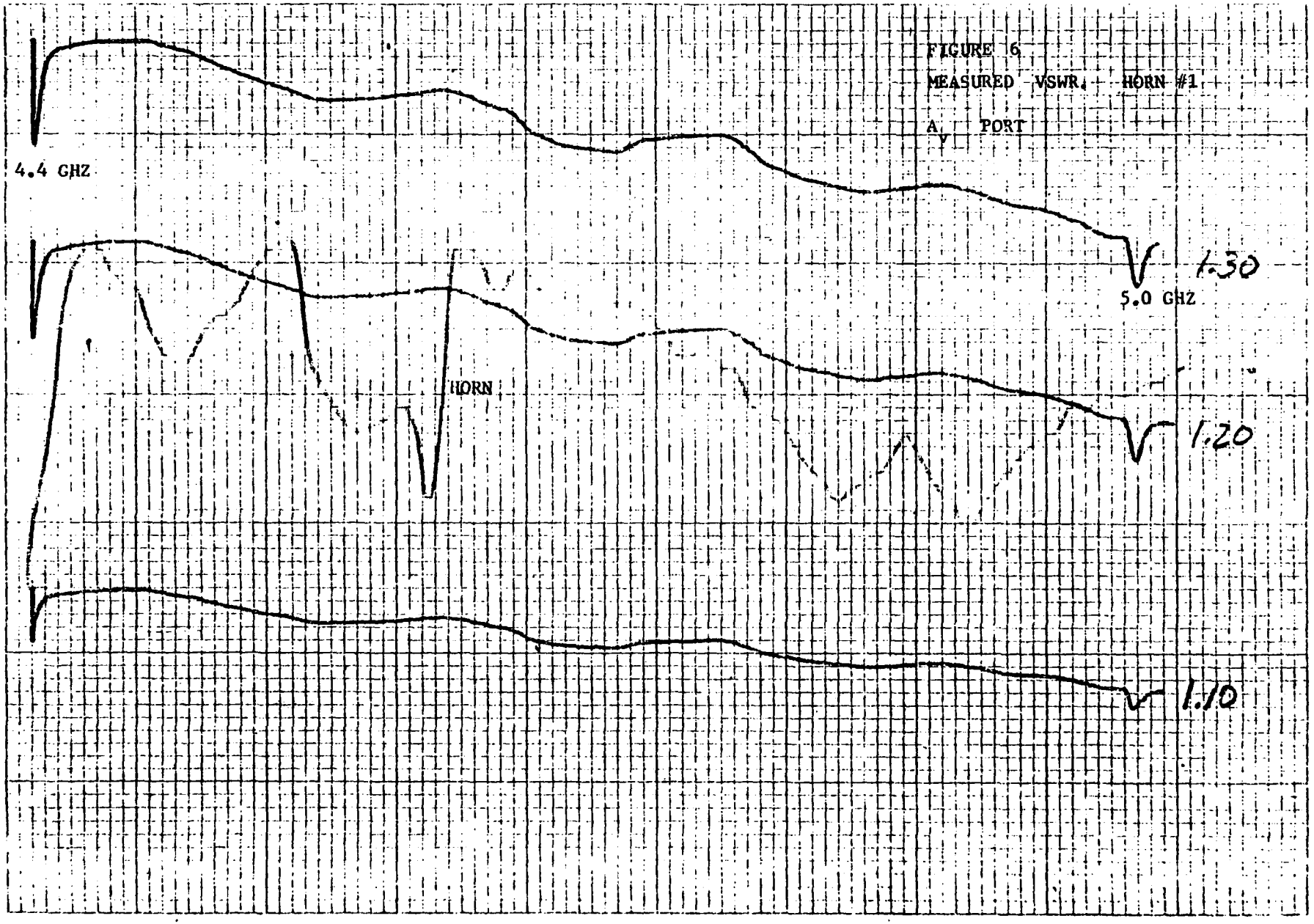


FIGURE 6
MEASURED VSWR, HORN #1
A PORT
4.4 GHZ
5.0 GHZ
1.30
HORN
1.20
1.10

FIGURE 6

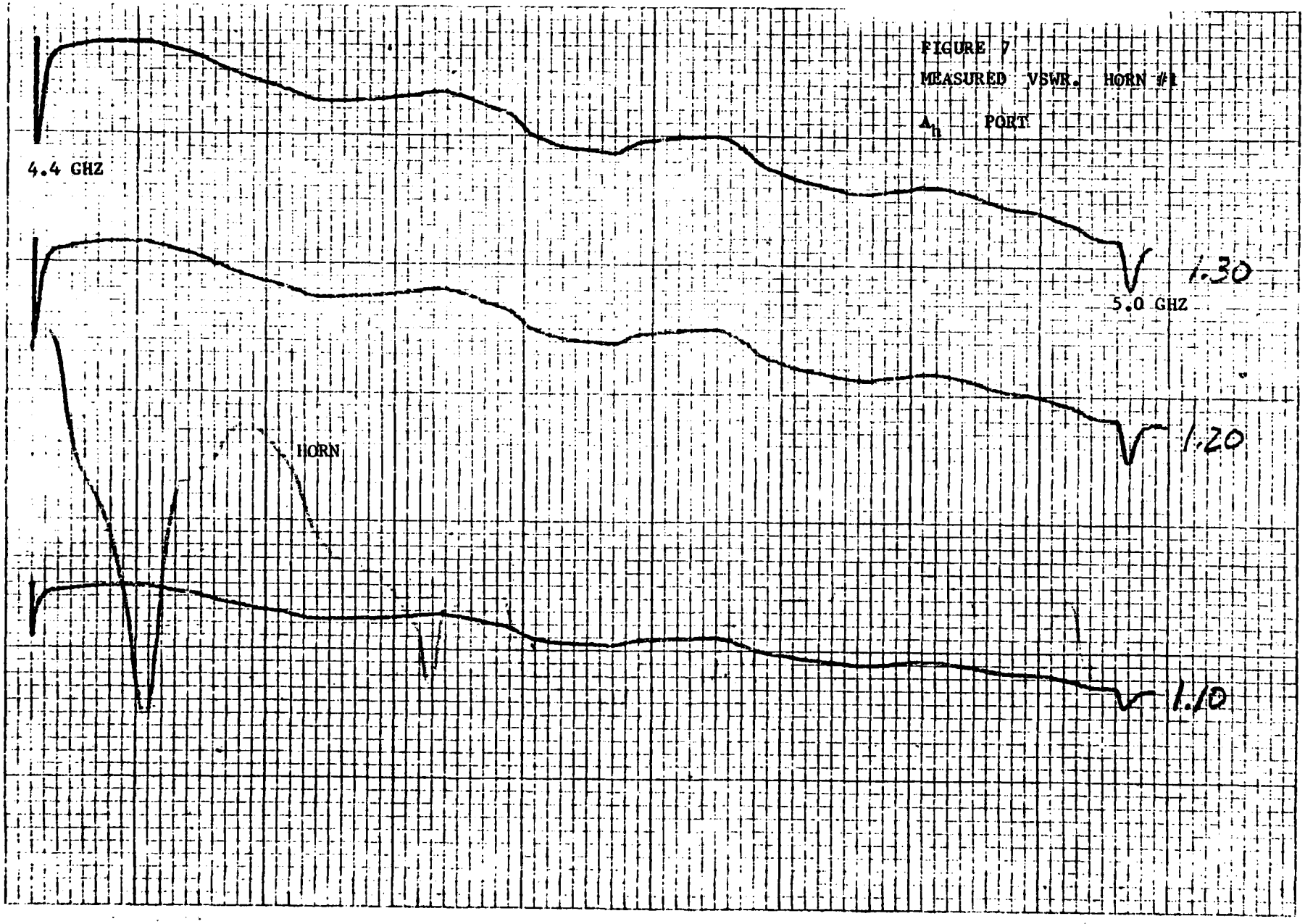


FIGURE 7
MEASURED VSWR, HORN #1
A_h PORT
4.4 GHZ
1.30
5.0 GHZ
1.20
HORN
1.10

FIGURE 7

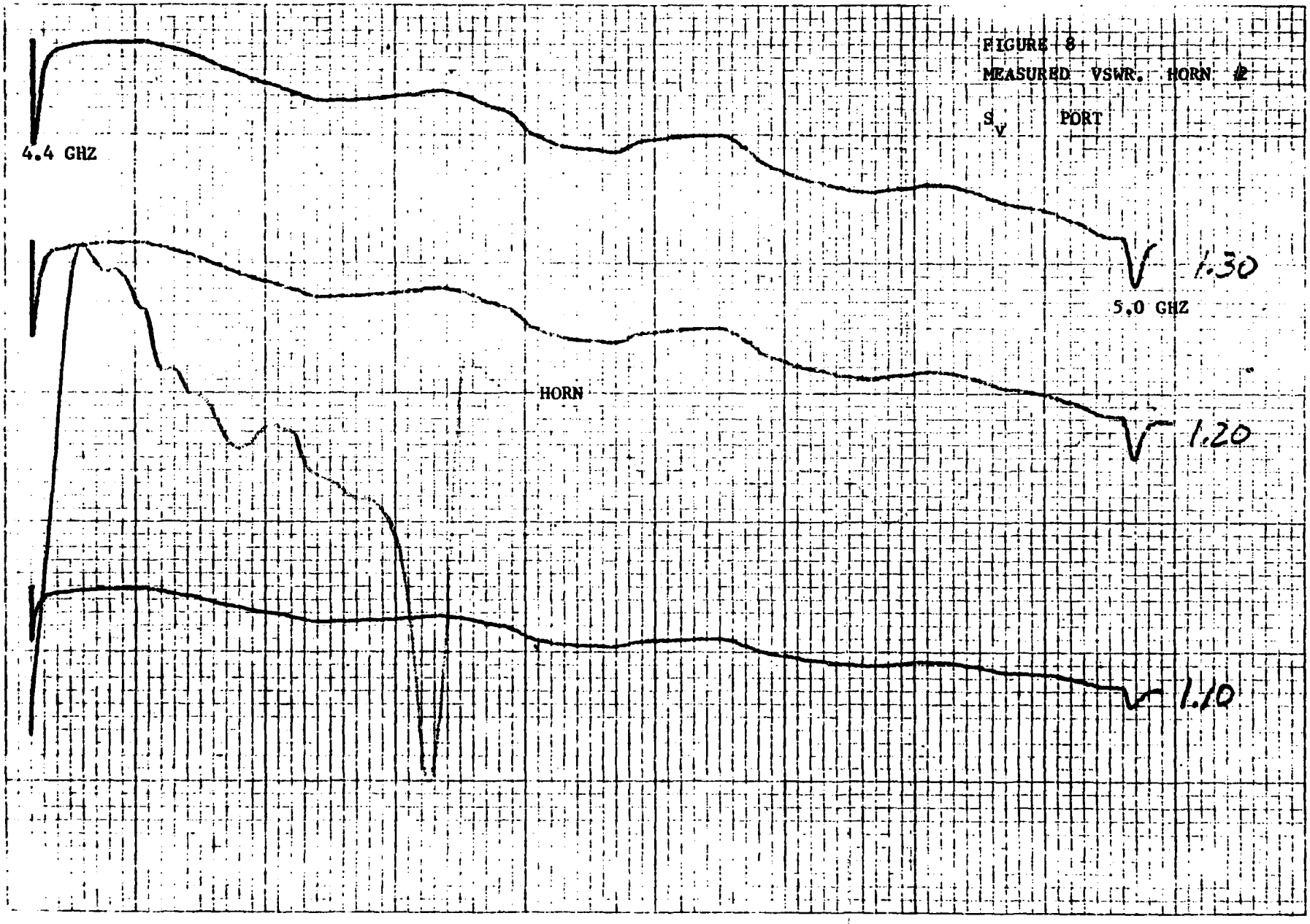


FIGURE 8
MEASURED VSWR. HORN #2
S V PORT
4.4 GHZ
1.30
5.0 GHZ
HORN
1.20
1.10

FIGURE 8

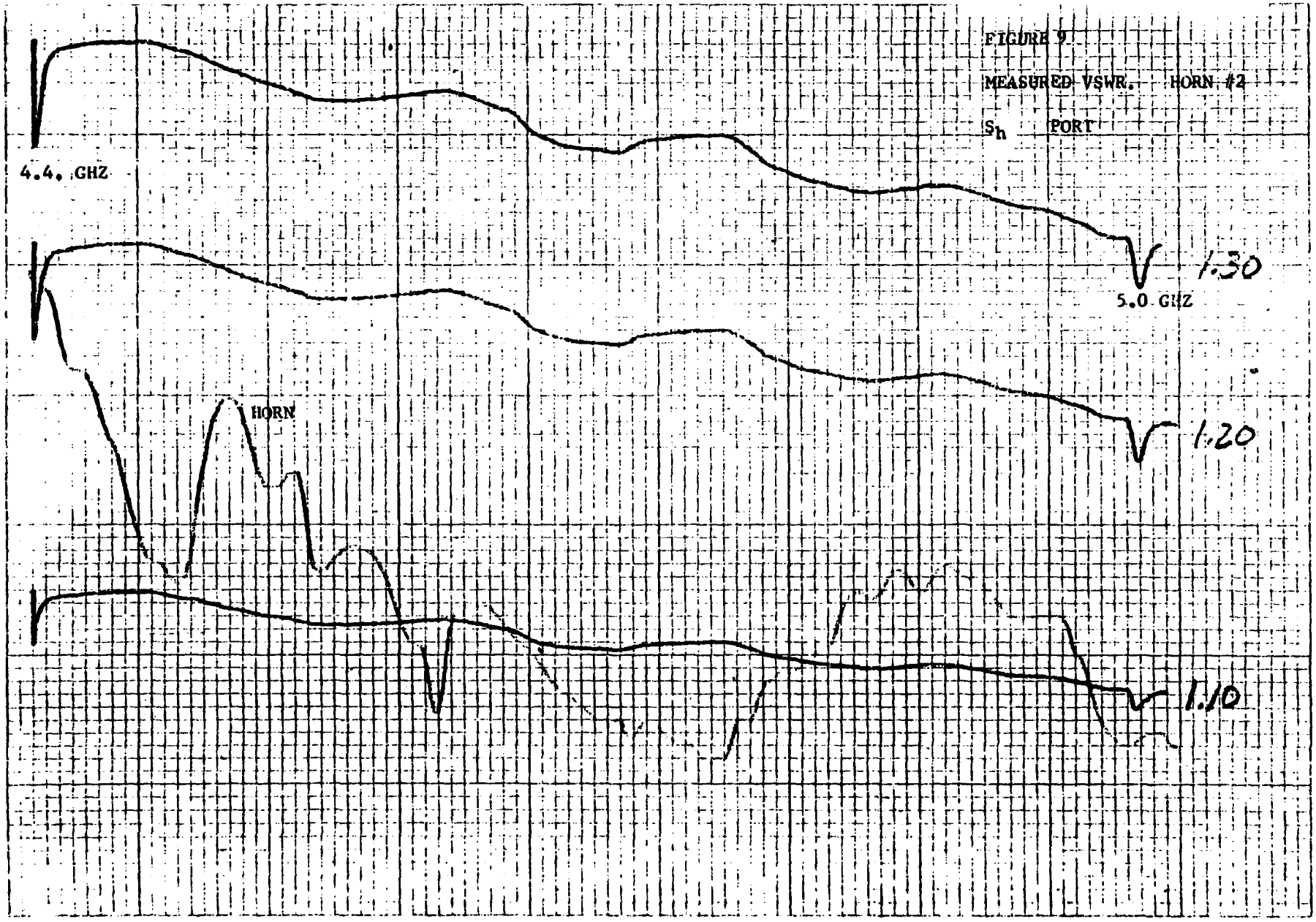


FIGURE 9
MEASURED VSWR. HORN #2
S_h PORT
4.4. GHZ
1.30
5.0 GHZ
HORN
1.20
1.10

FIGURE 9

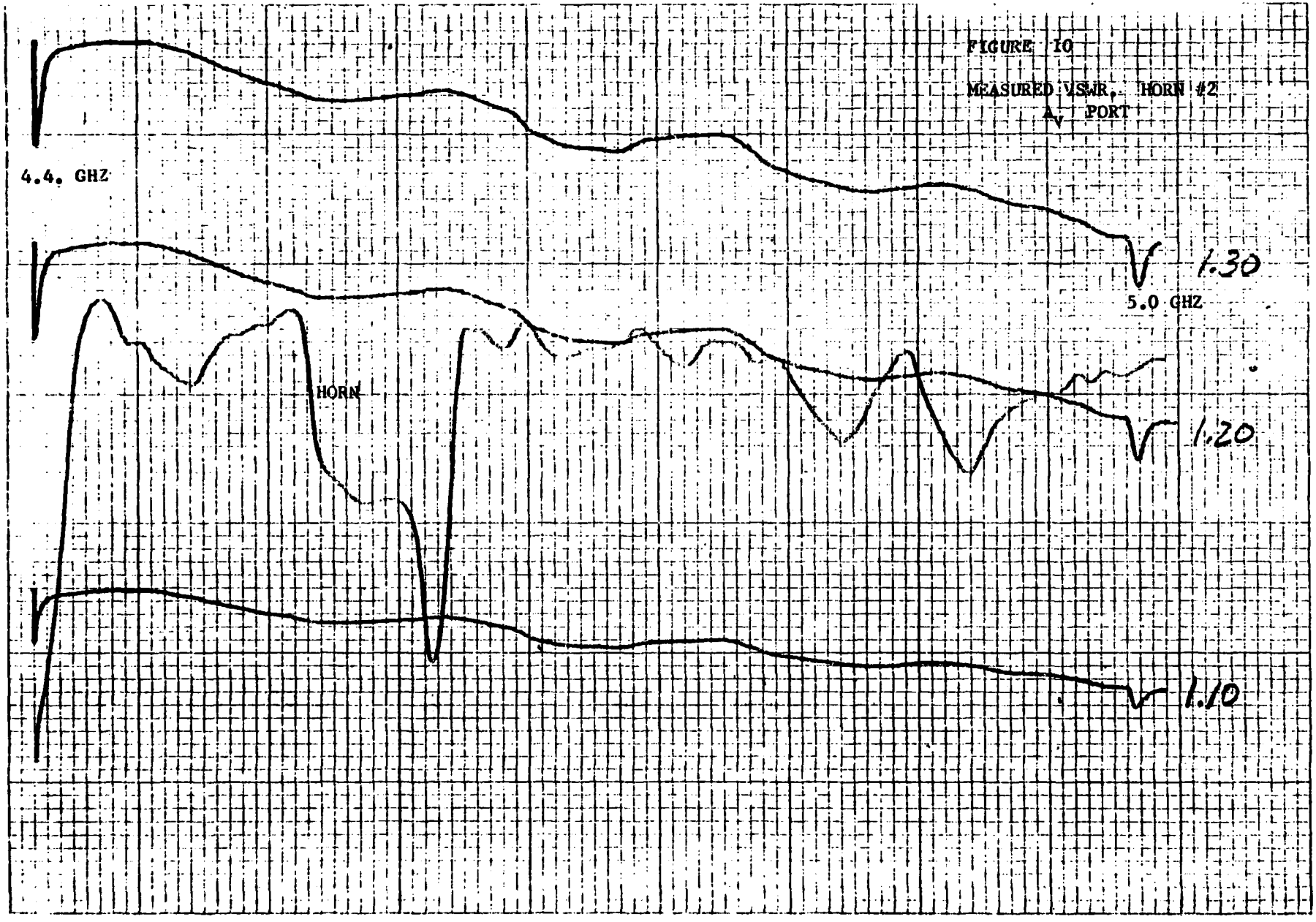


FIGURE 10

MEASURED VSWR, HORN #2
A_V PORT

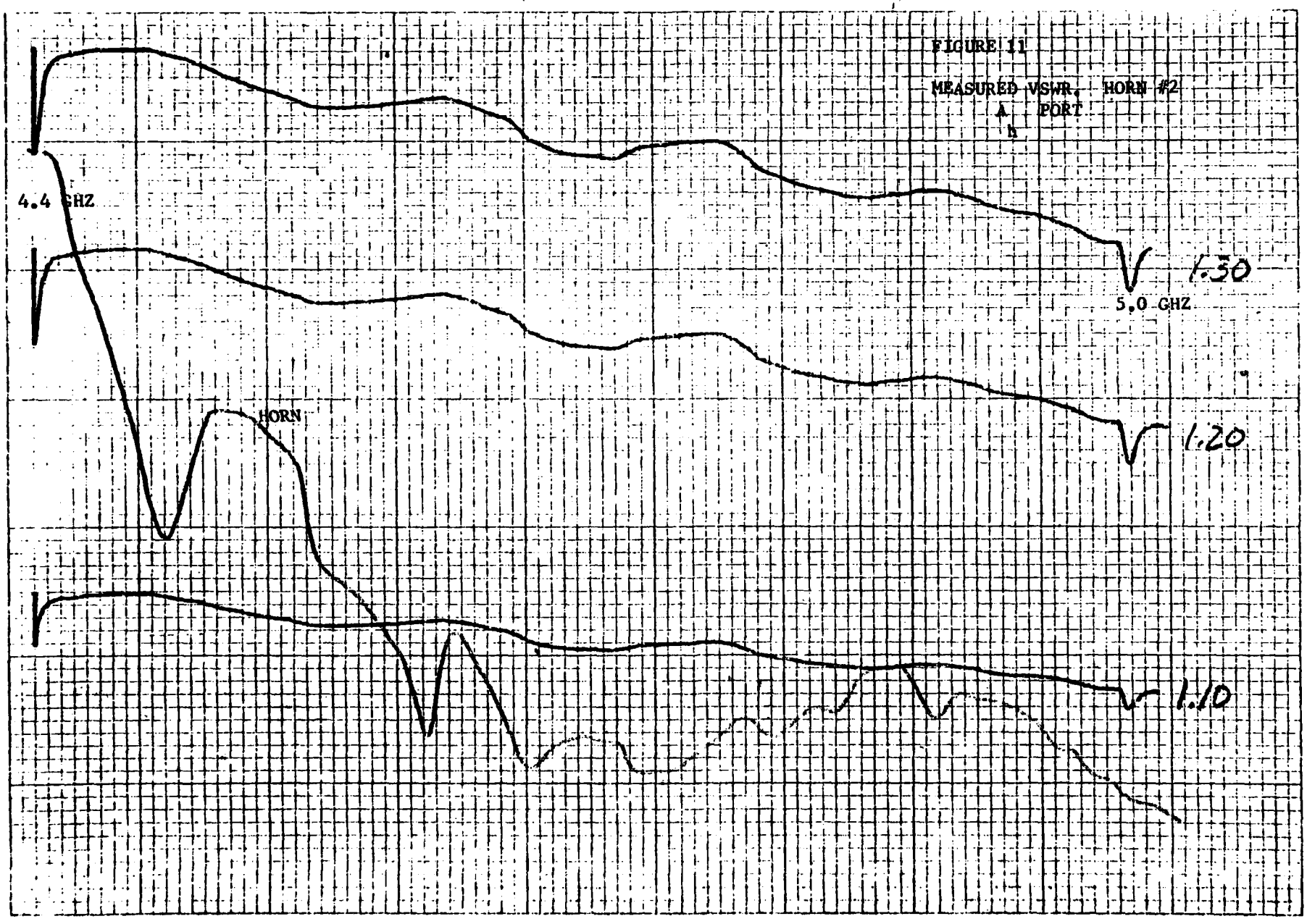


FIGURE 11
MEASURED VSWR, HORN #2
A PORT
b
4.4 GHZ
5.0 GHZ
1.30
1.20
1.10
HORN

FIGURE 11

6-16.77

FIGURE 12

MEASURED ISOLATION

HORN #1

PORTS A_h - S_h

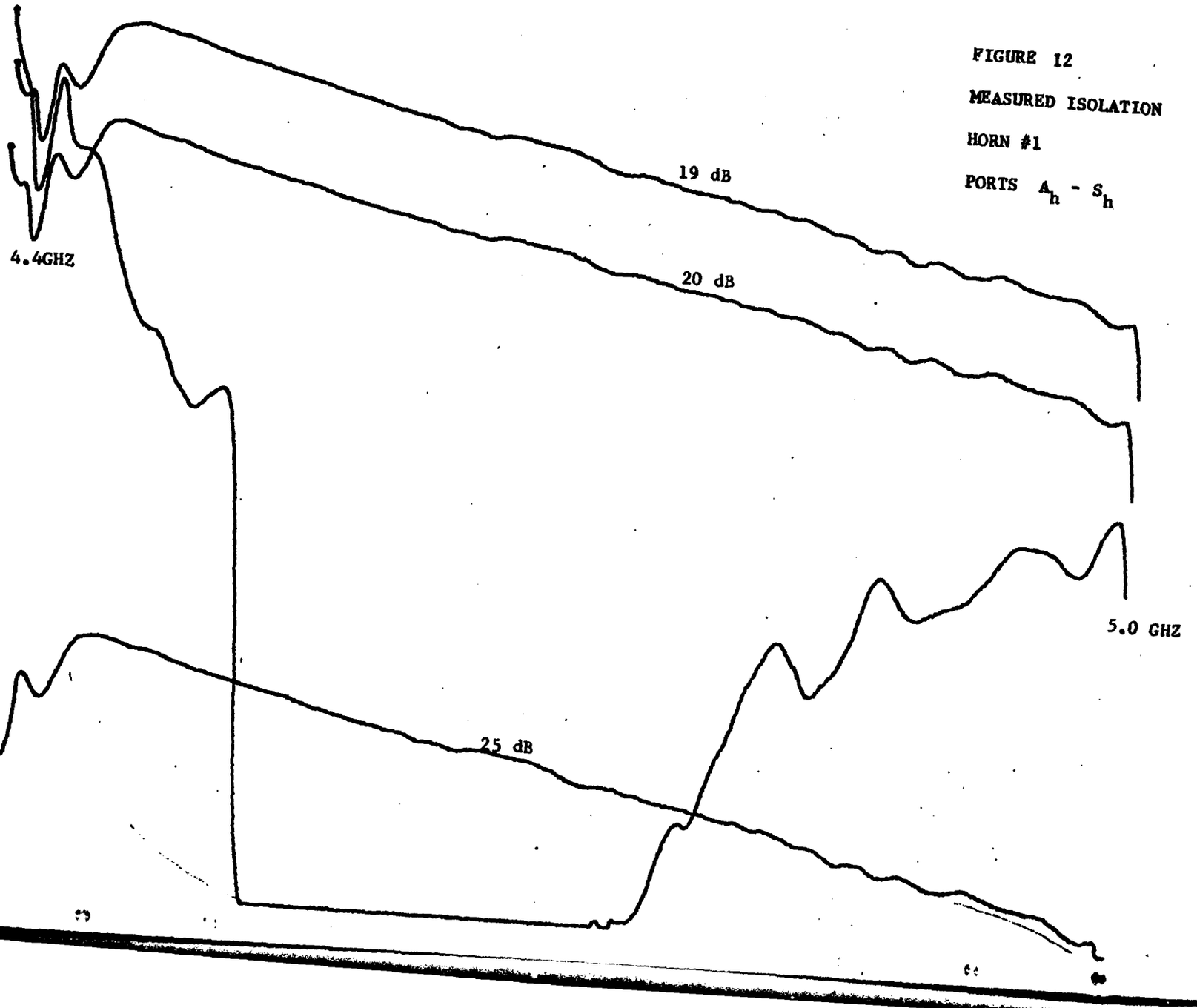


FIGURE 12

6-167
MCR

FIGURE 13

MEASURED ISOLATION

PORTS A_V -S_V

HORN #1

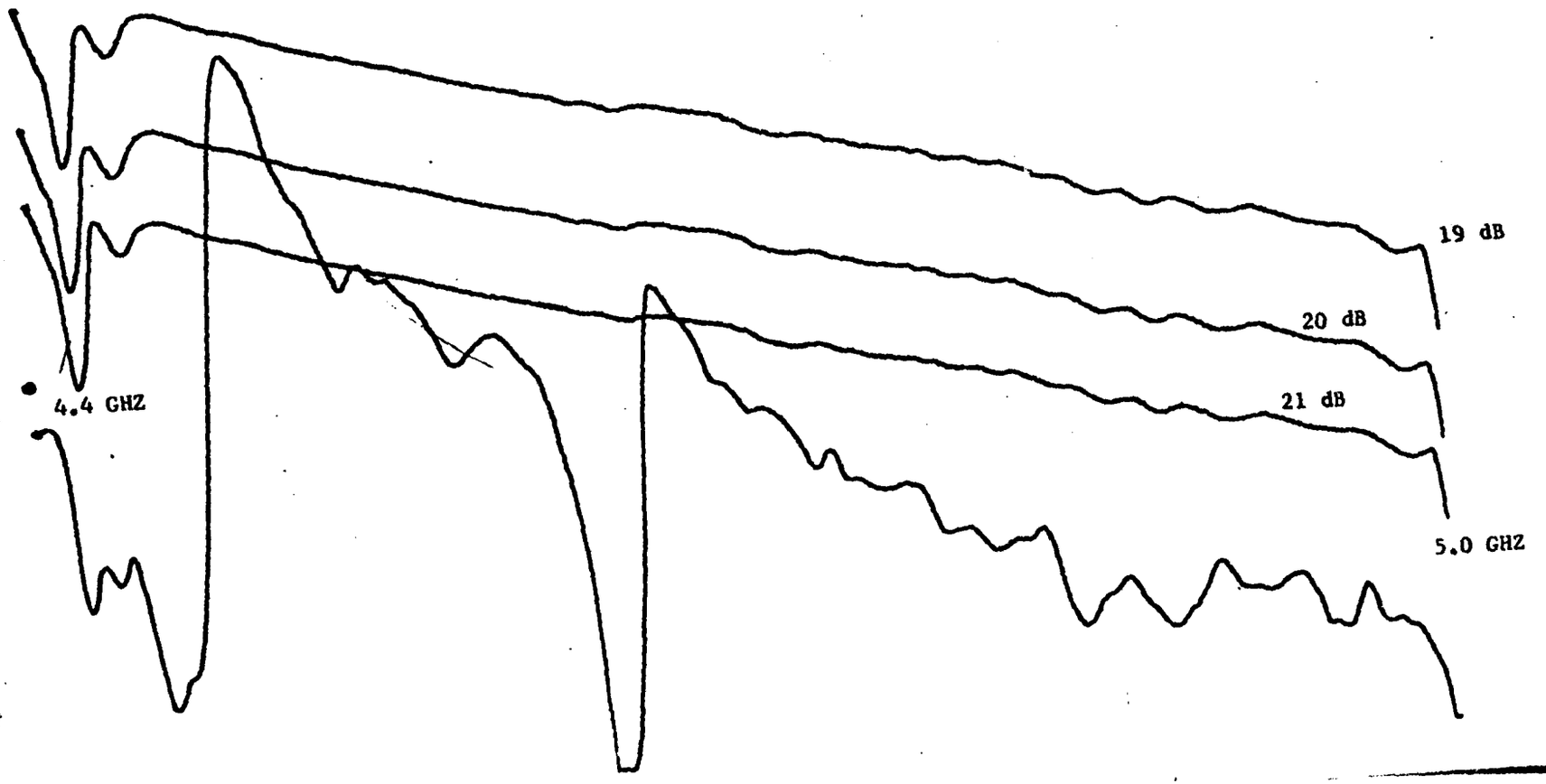


FIGURE 13

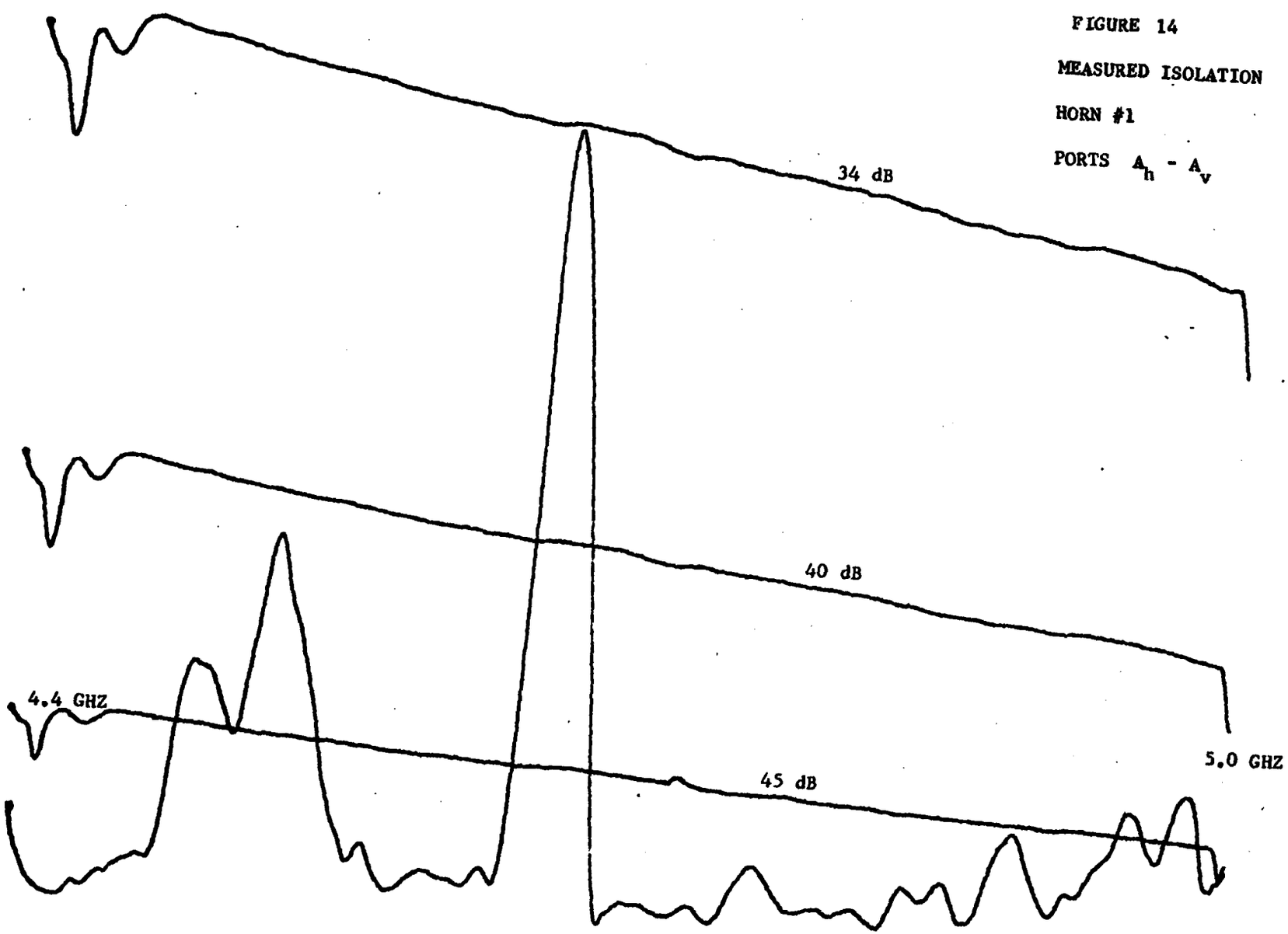


FIGURE 14

MEASURED ISOLATION

HORN #1

PORTS A_h - A_v

FIGURE 14

6-16-77
mca

FIGURE 15

MEASURED ISOLATION

HORN #1

PORTS $S_h - S_v$

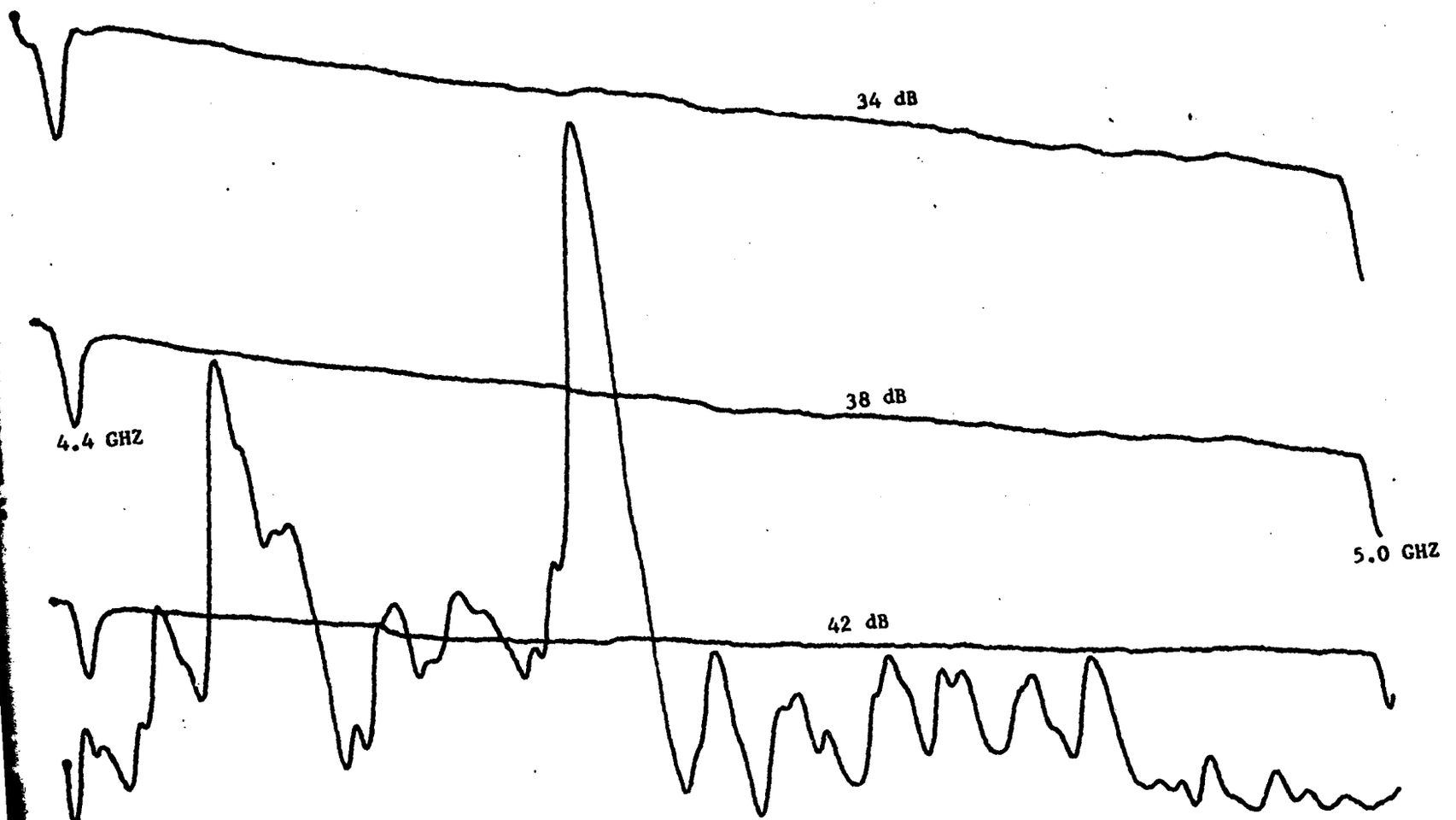


FIGURE 16

MEASURED ISOLATION

HORN #1

PORTS A_v - S_h

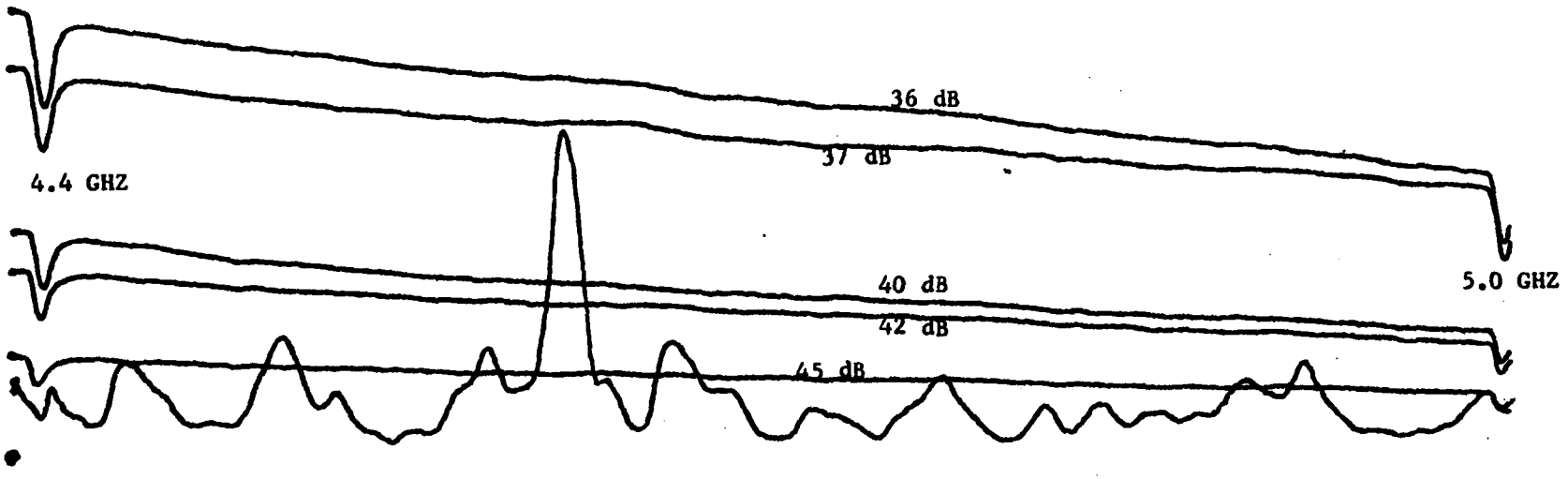


FIGURE 16

6-16-77
mm

FIGURE 17

MEASURED ISOLATION

HORN #1

PORTS S_v - A_h

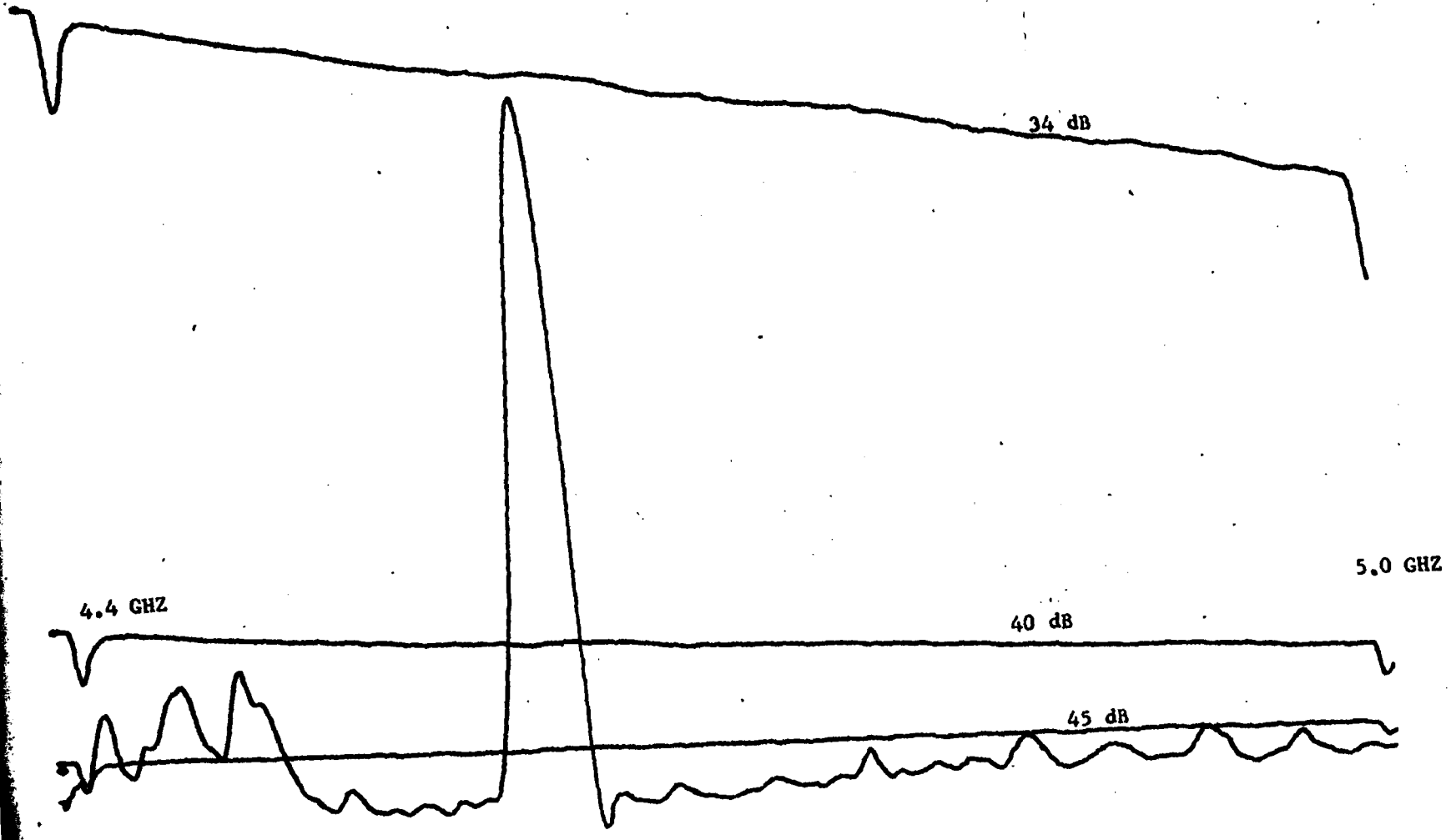


FIGURE 18

MEASURED ISOLATION

HORN #2

PORTS A_h - S_h

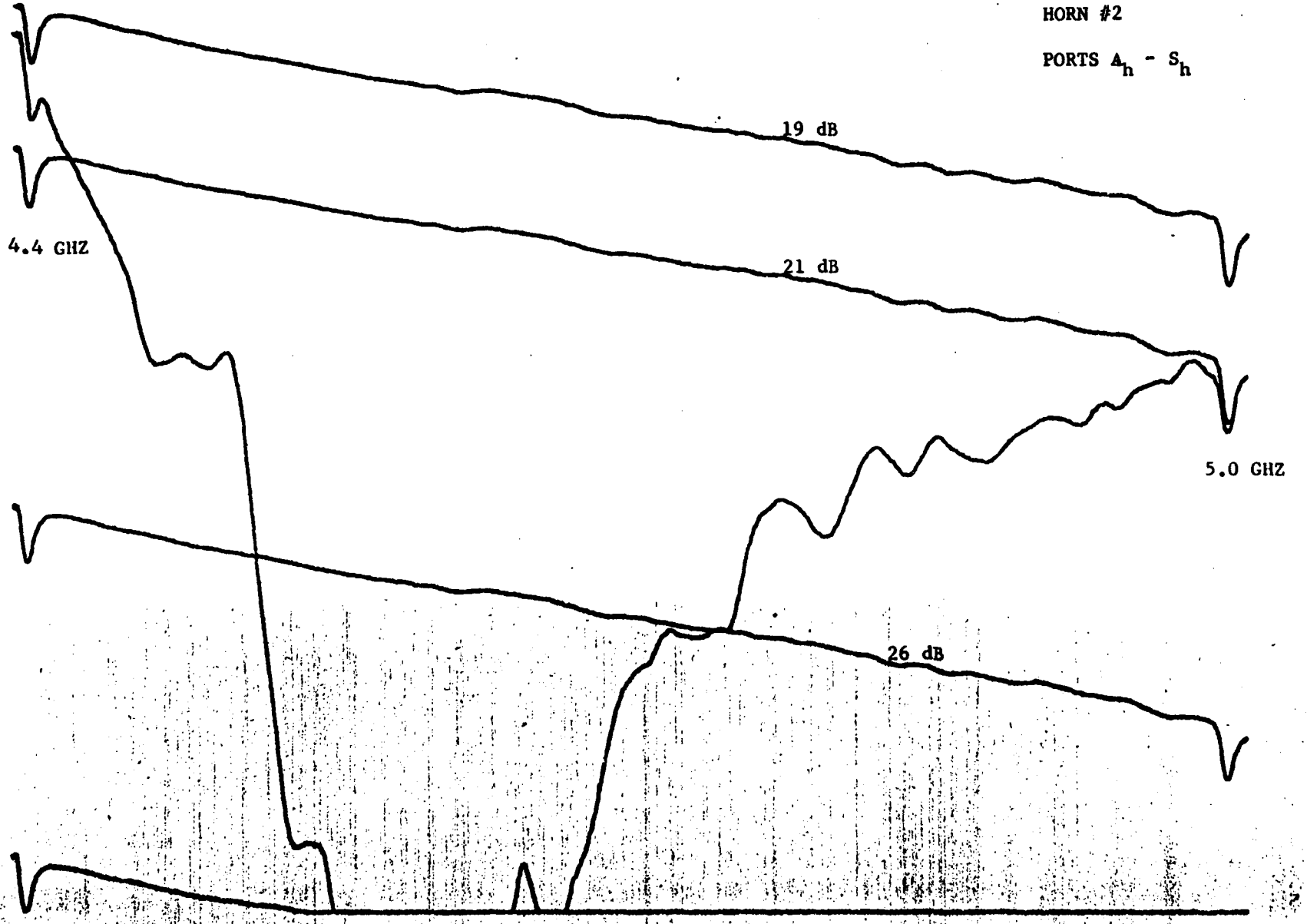


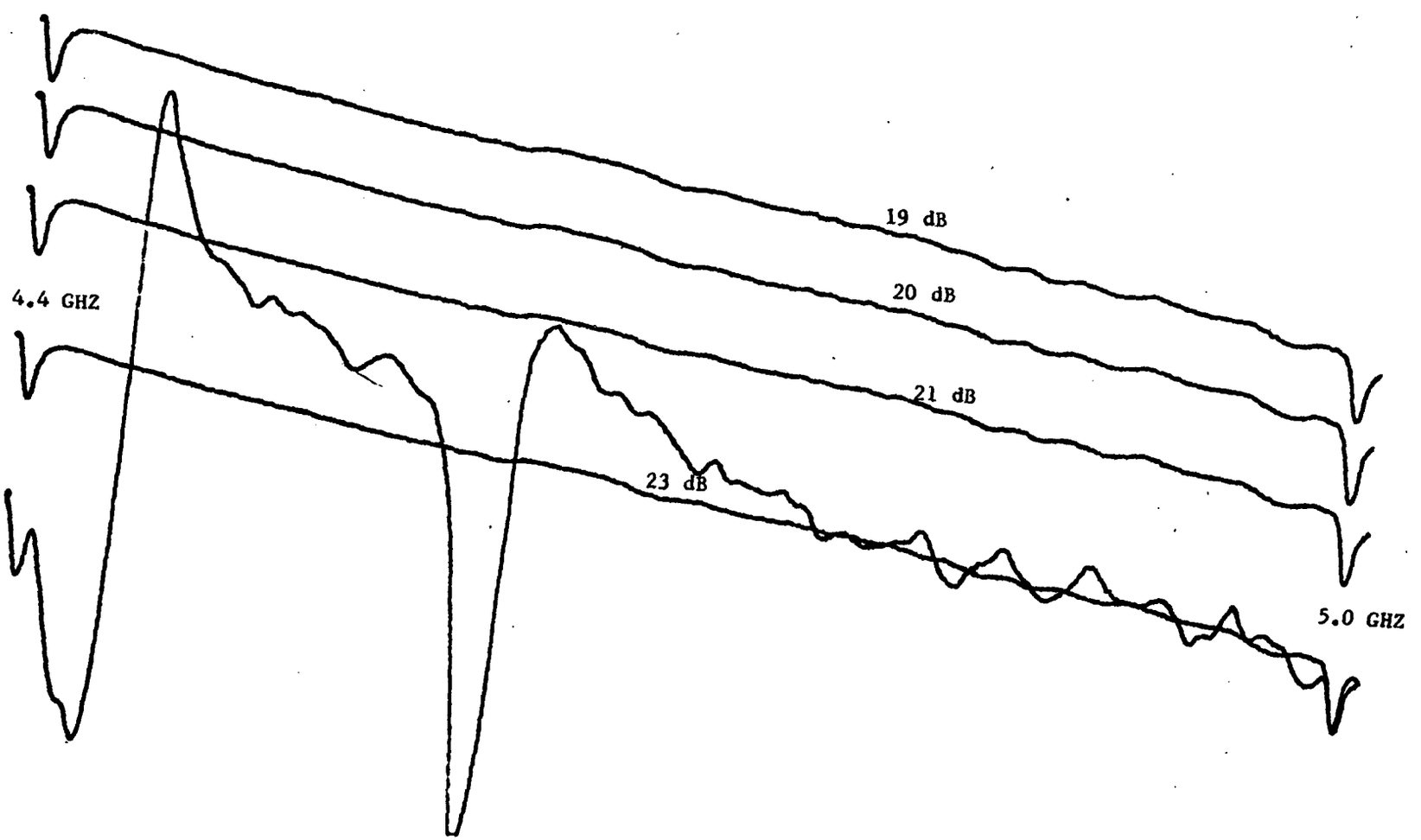
FIGURE 18

FIGURE 19

MEASURED ISOLATION

HORN #2

PORTS A_V - S_V



6.17.77

FIGURE 20

MEASURED ISOLATION

HORN #2

PORTS A_h - A_v

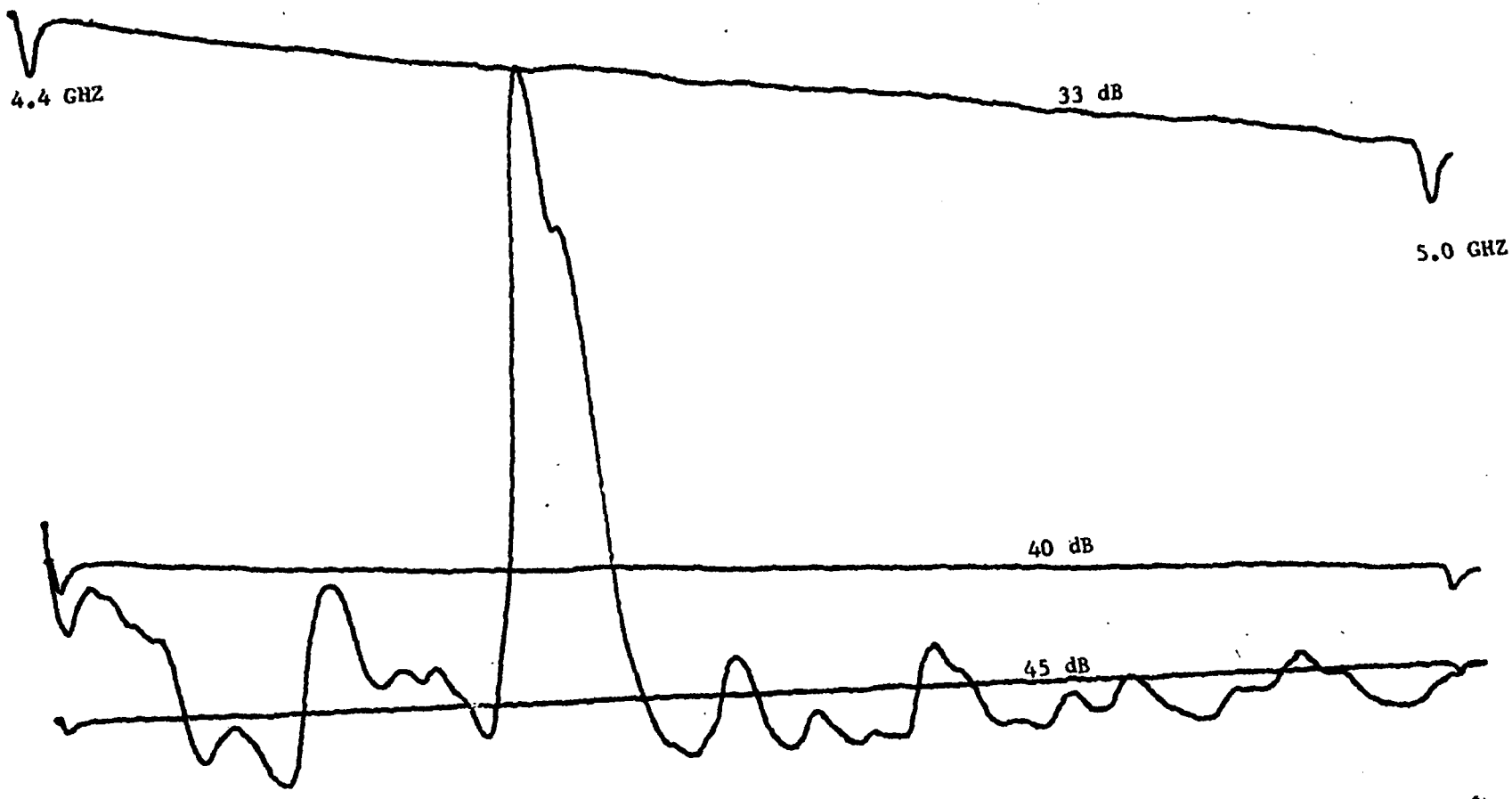


FIGURE 20

FIGURE 21

MEASURED ISOLATION

HORN #2

PORTS S_h - S_v

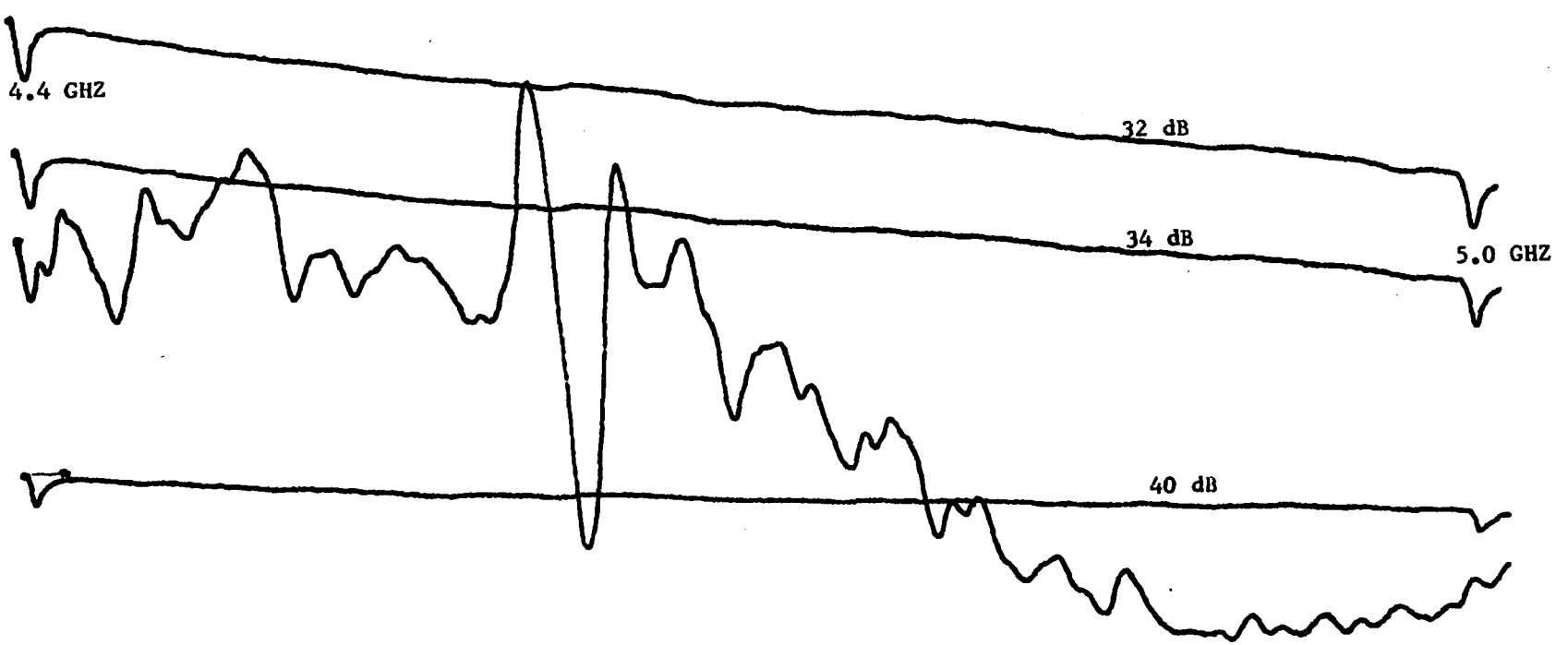


FIGURE 21

FIGURE 22

MEASURED ISOLATION

HORN # 2

PORTS A_v - S_h

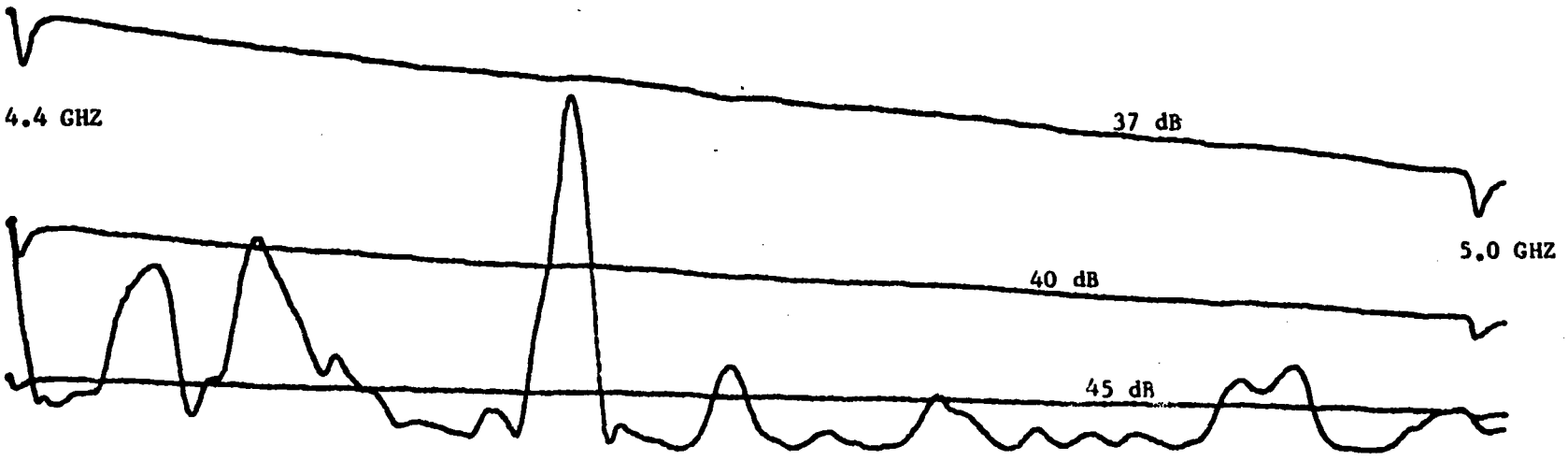


FIGURE 22

FIGURE 23

MEASURED ISOLATION

HORN #2

PORTS S_v - A_h

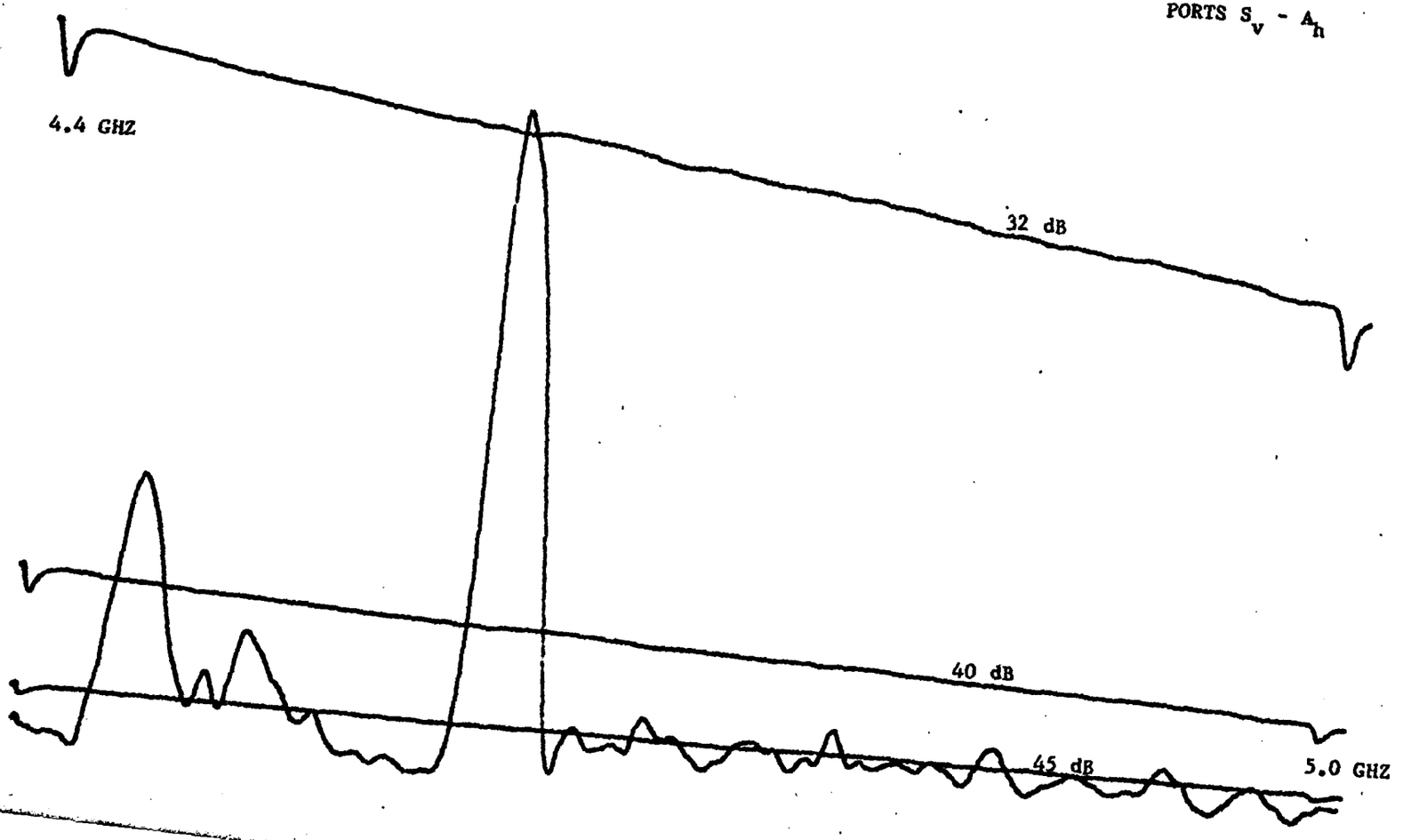


FIGURE 23

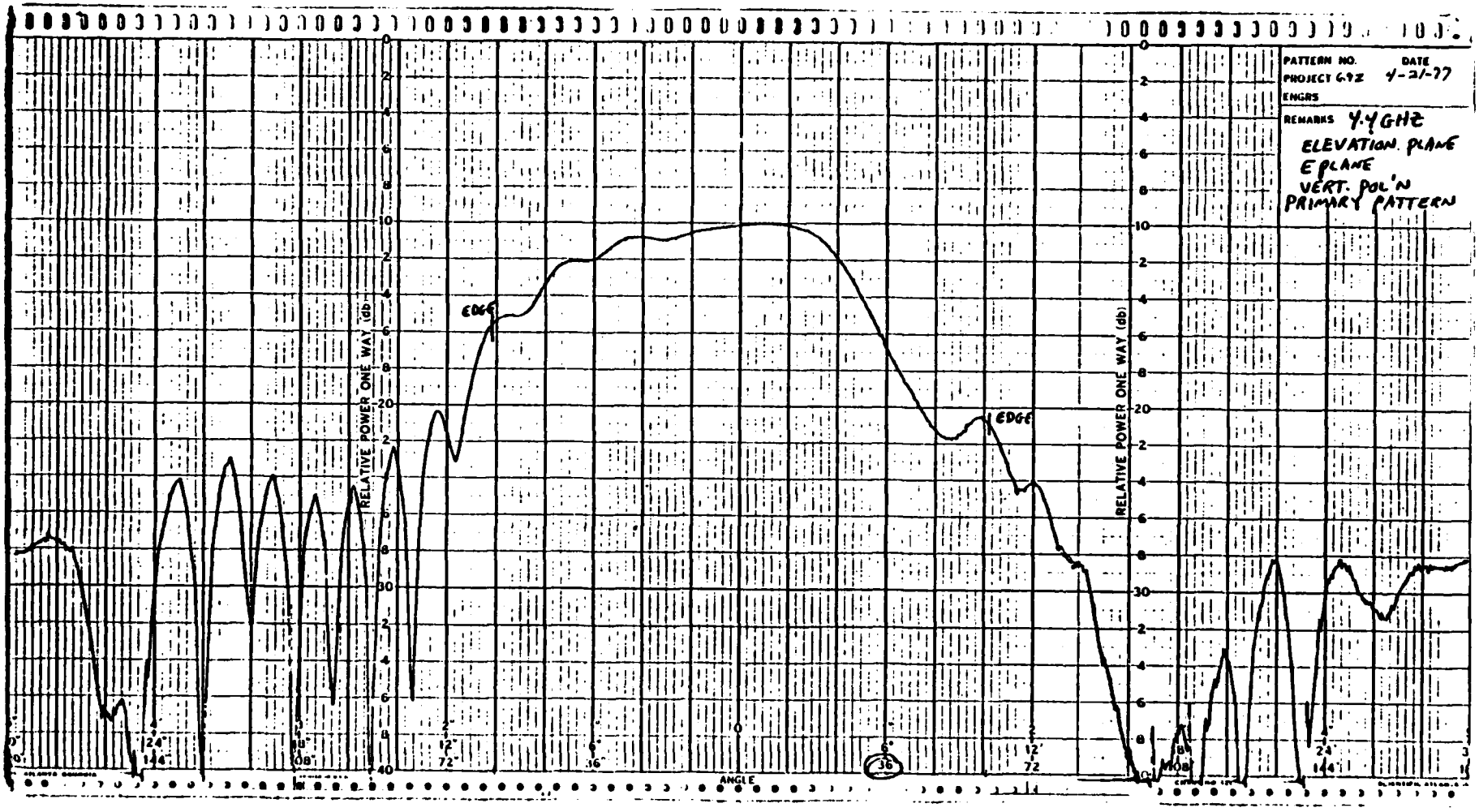

PATTERN NO.
DATE
PROJECT 692
4-21-77
ENGRS
REMARKS 4.4 GHz
ELEVATION PLANE
E PLANE
VERT. POL'N
PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
EDGE
ANGLE

FIGURE 24

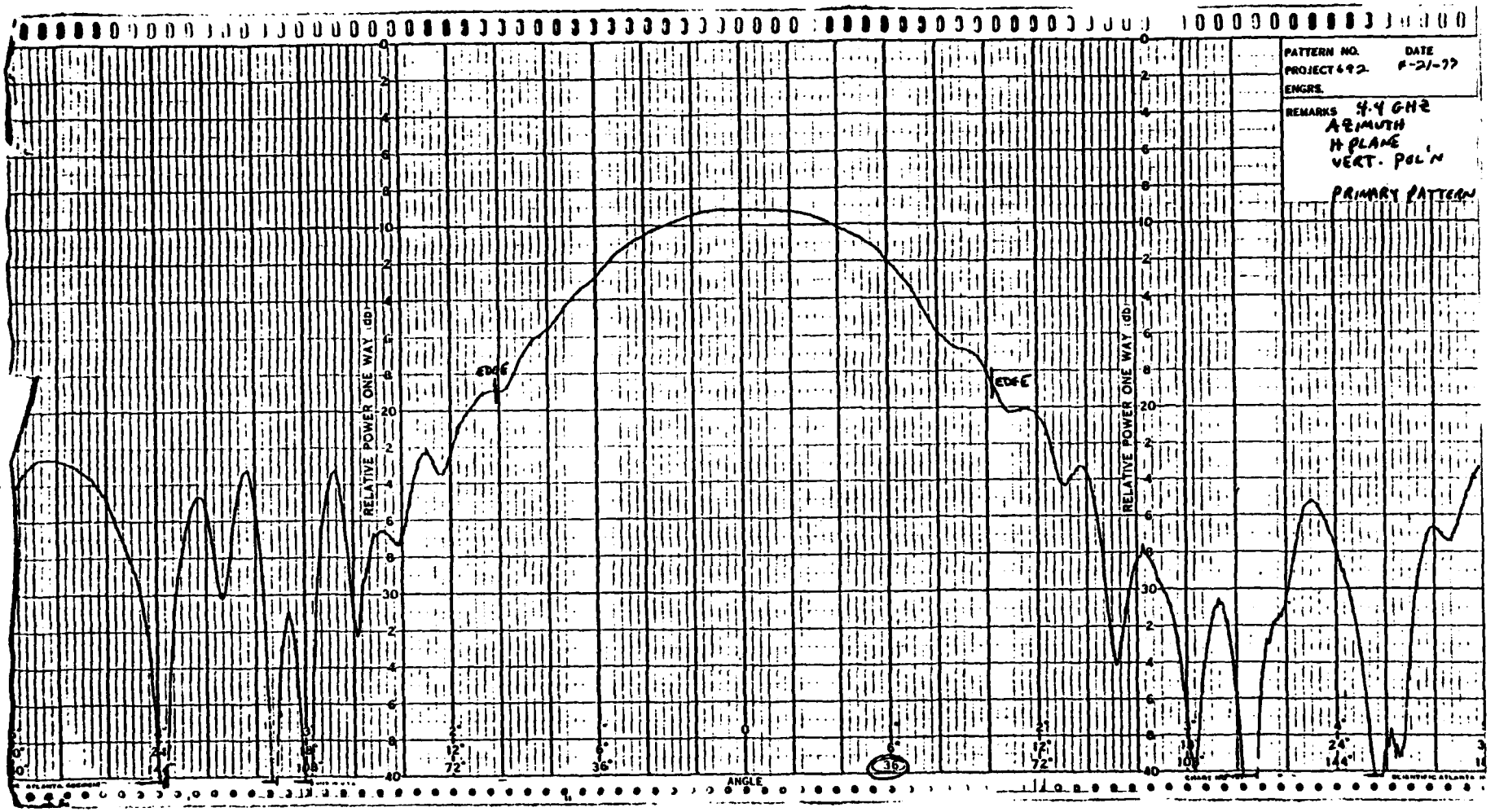

PATTERN NO.
PROJECT 692
DATE 8-21-77
ENGRS.
REMARKS 4.4 GHz
AZIMUTH
H PLANE
VERT. POL'N
PRIMARY PATTERN
EDGE
EDGE
RELATIVE POWER ONE WAY (dB)
ANGLE

FIGURE 25

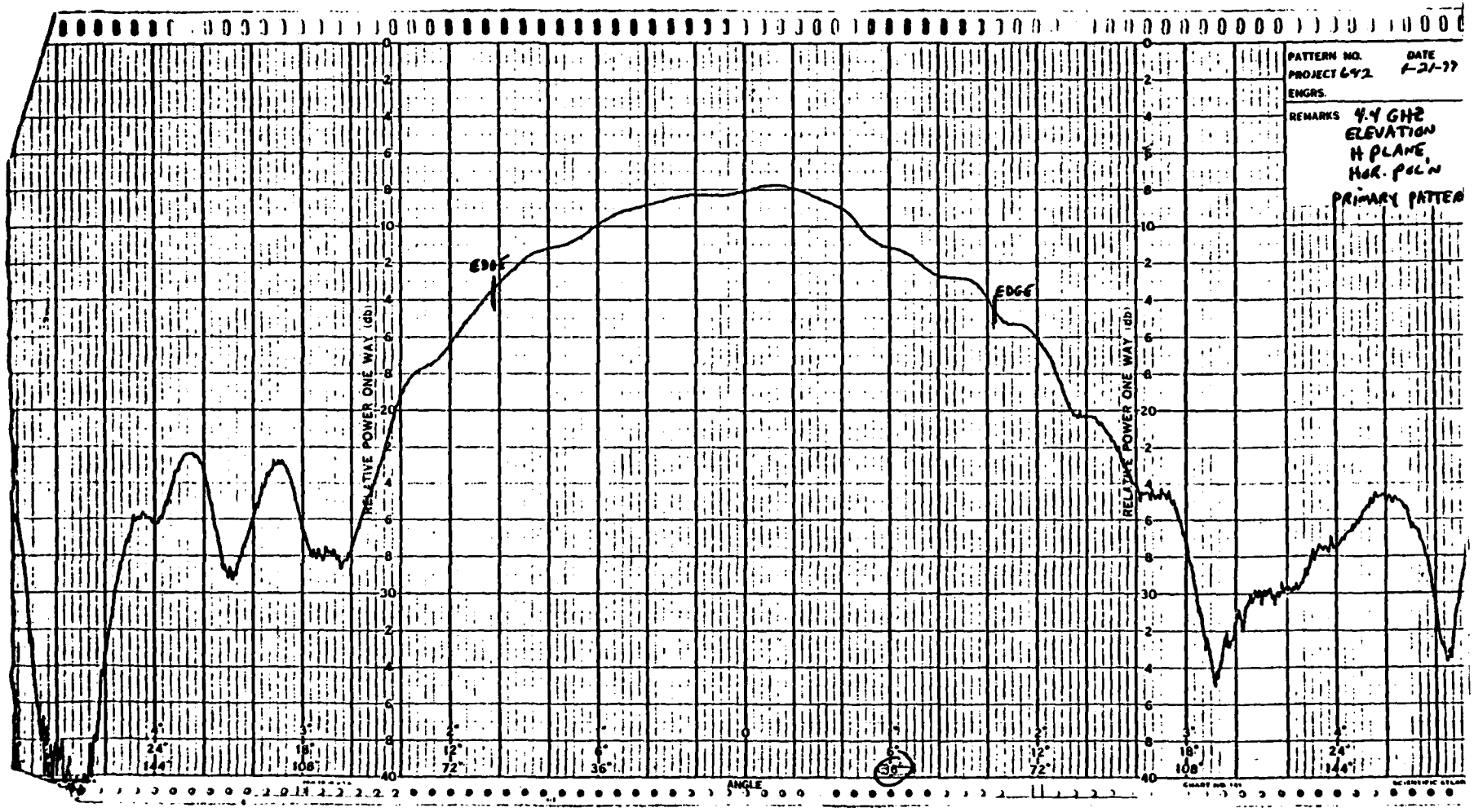

PATTERN NO.
PROJECT 642
ENGRS.
DATE 4-21-77
REMARKS 4.4 GHz ELEVATION H PLANE, HOR. POL'N PRIMARY PATTERN
EDGE
EDGE
RELATIVE POWER ONE WAY (db)
ANGLE
0
2
4
6
8
10
20
30
40
24° 144°
18° 108°
12° 72°
6° 36°
3°
2°

FIGURE 26

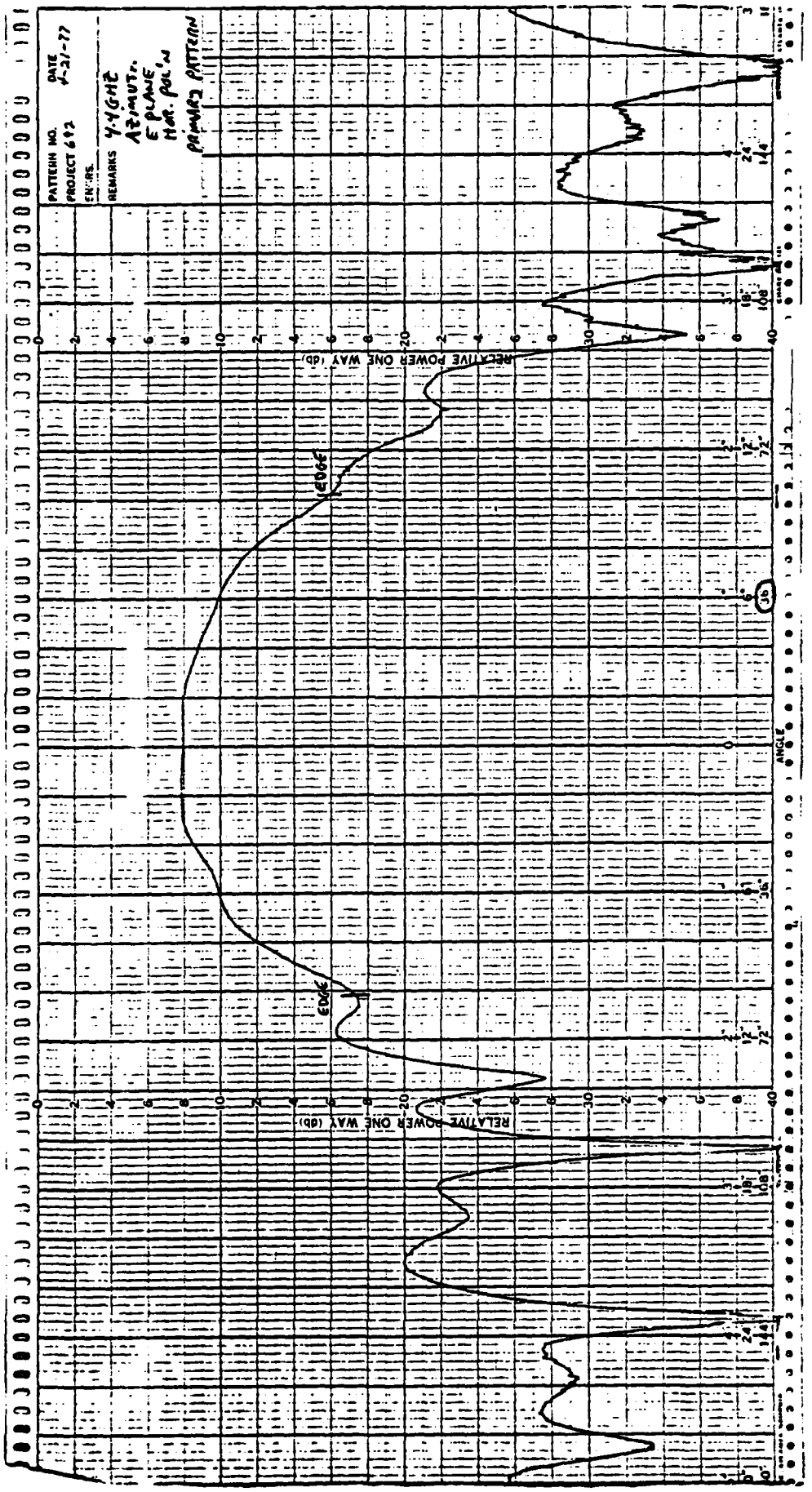

PATTERN NO.
PROJECT 692
DATE 4-21-77
REMARKS 4.4GHZ
AZIMUTH
E PLANE
HOR. POL'N
PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
ANGLE

FIGURE 27

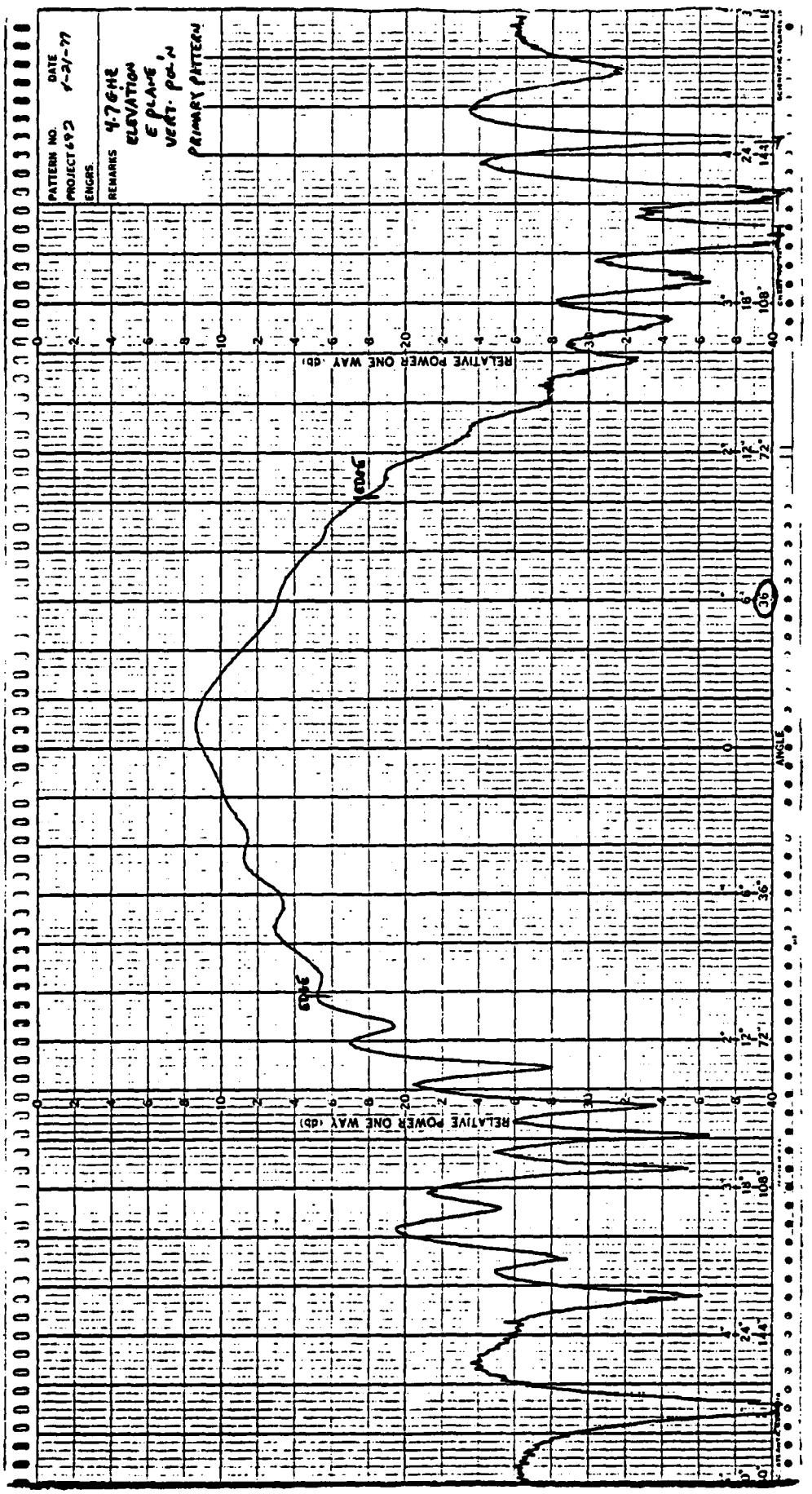

PATTERN NO.
PROJECT 692
ENGRS.
DATE 1-31-77
REMARKS 4.7 GHz ELEVATION E PLANE, VERT. POL PRIMARY PATTERN
RELATIVE POWER ONE WAY (dB)
EDGE
EDGE
ANGLE

FIGURE 28

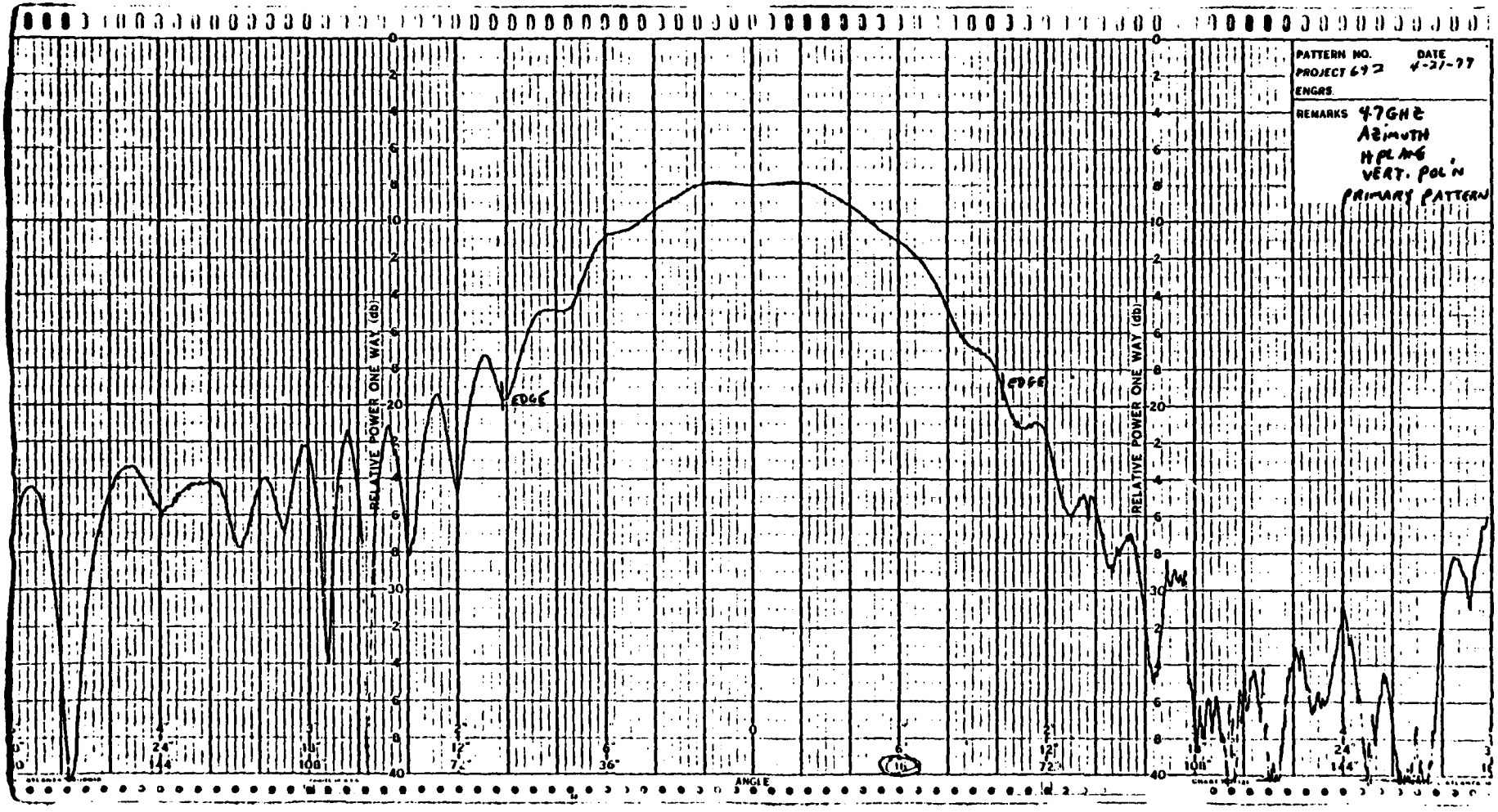
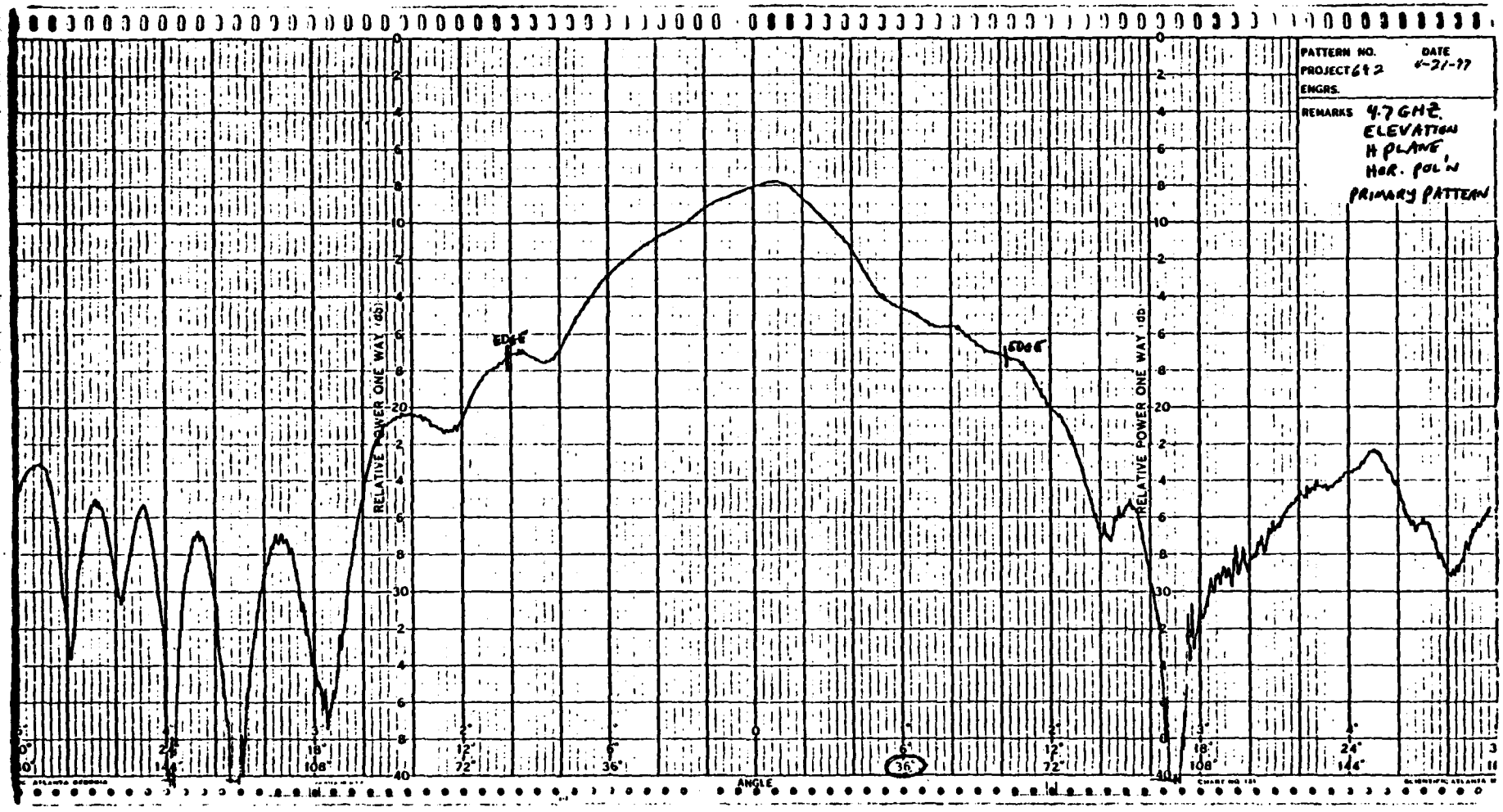
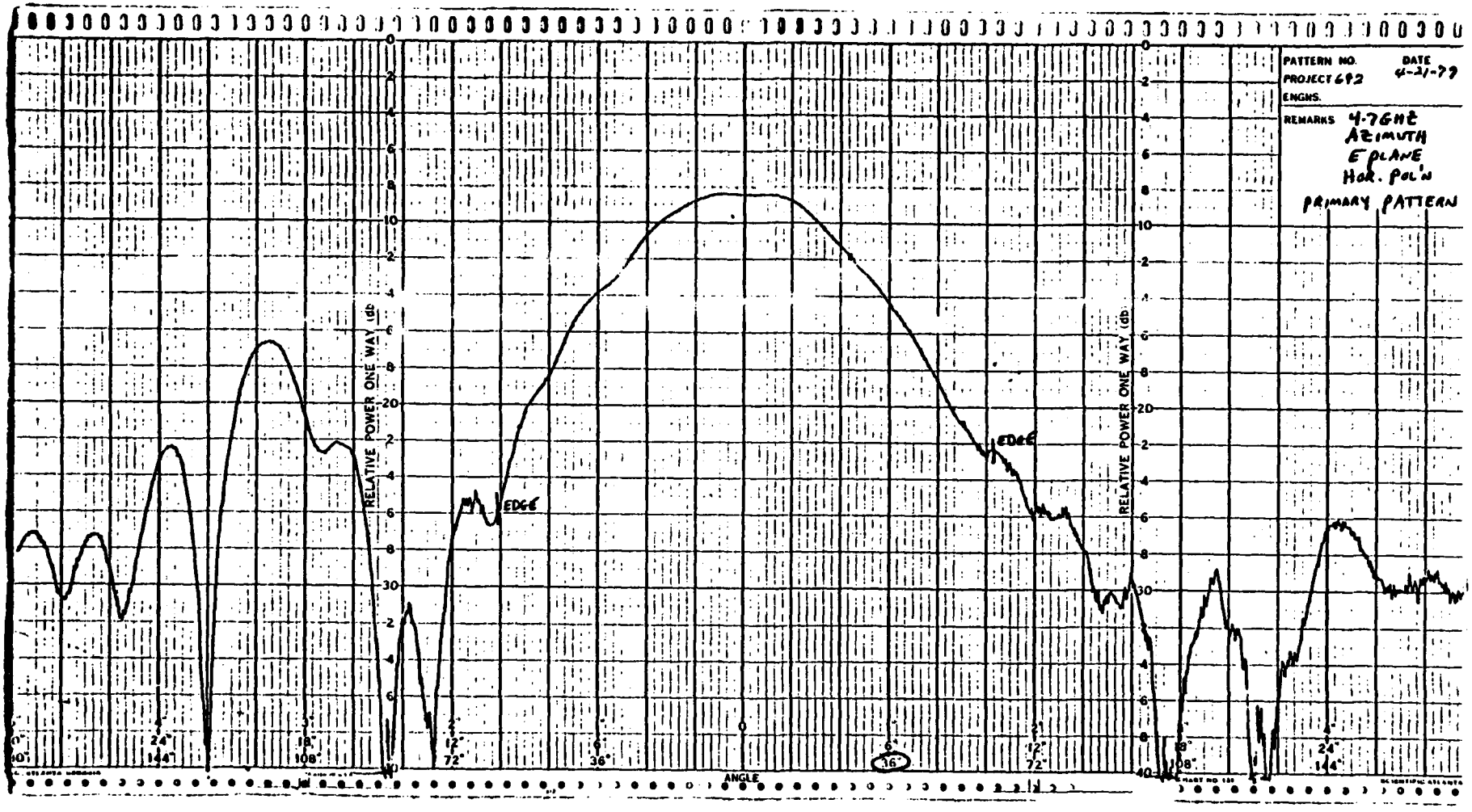

PATTERN NO.
DATE 4-27-77
PROJECT 693
ENGRS
REMARKS 4.7GHz
AZIMUTH
H PLANE
VERT. POL'N
PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
EDGE
ANGLE

FIGURE 29


PATTERN NO.
DATE 6-21-77
PROJECT 642
ENGRS.
REMARKS 4.7 GHz.
ELEVATION
H PLANE
HOR. POL'N
PRIMARY PATTERN
EDGE
EDGE
RELATIVE POWER ONE WAY (dB)
RELATIVE POWER ONE WAY (dB)
ANGLE
0°
2°
144°
18°
108°
12°
72°
6°
36°
0
6°
36°
12°
72°
18°
108°
24°
144°


PATTERN NO.
PROJECT 692
ENGNS.
DATE 4-21-77
REMARKS 4.7GHz
AZIMUTH
E PLANE
Hor. Pol'n
PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
EDGE
ANGLE
10°
24°
144°
18°
108°
12°
72°
6°
36°
0
6°
36°
12°
72°
18°
108°
24°
144°

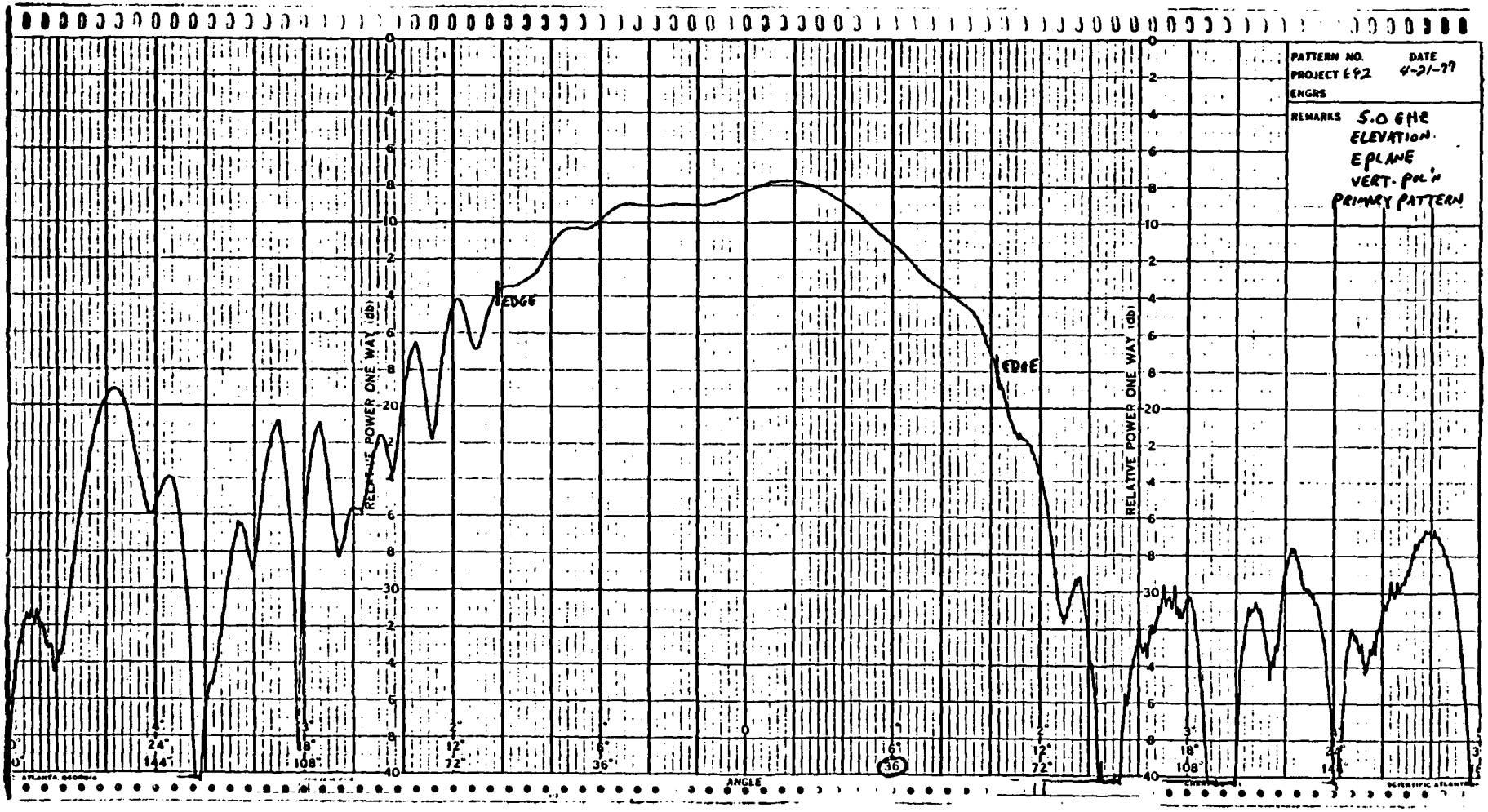
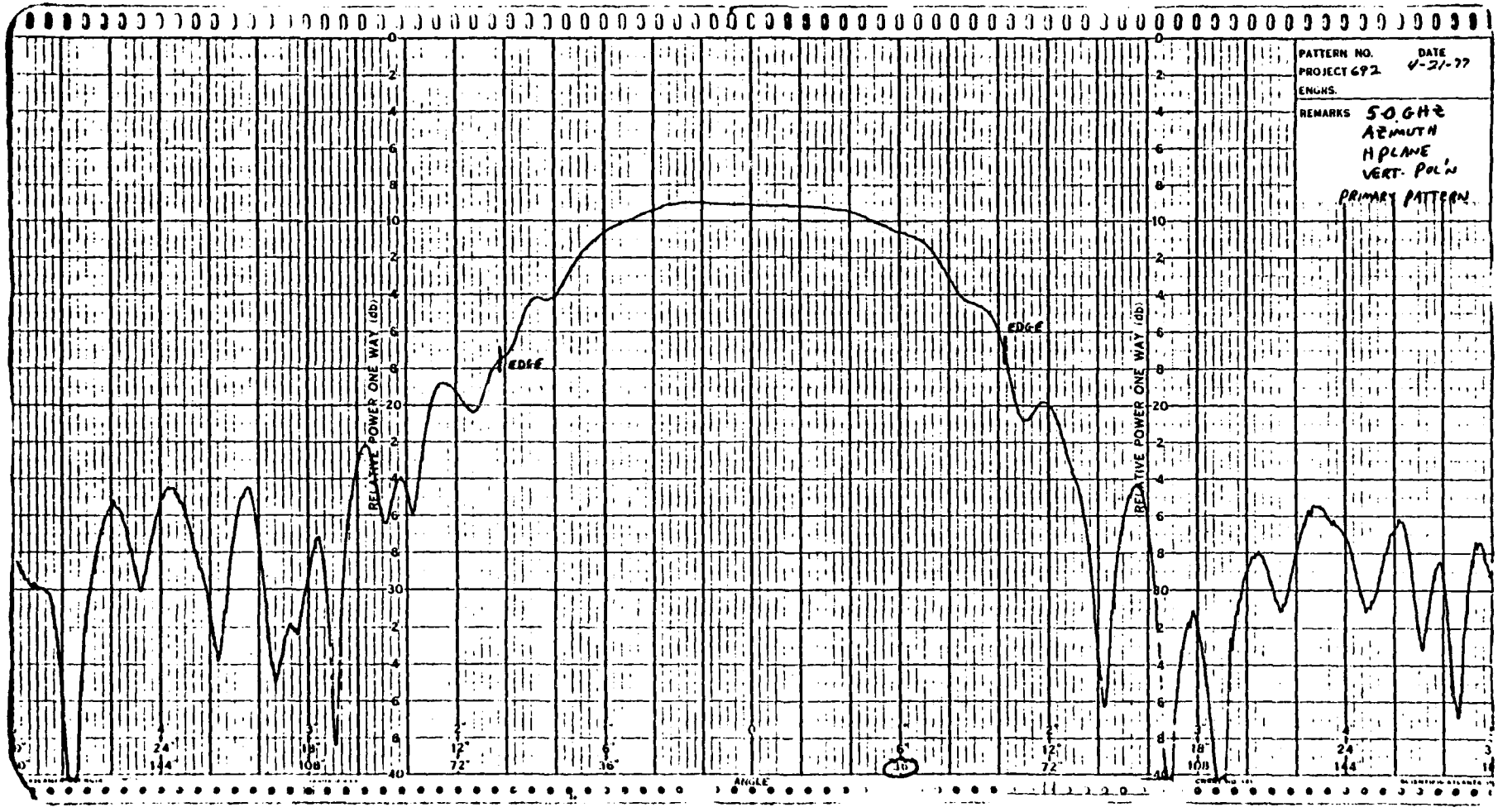

PATTERN NO.
DATE 4-21-77
PROJECT 692
ENGRS
REMARKS 5.0 GHz ELEVATION. E PLANE VERT. POL'N PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
EDGE
ANGLE
24° 144
18° 108
12° 72
6° 36
0
6° 36
12° 72
18° 108
24° 144

FIGURE 32


PATTERN NO.
DATE 4-21-77
PROJECT 692
ENGRS.
REMARKS 50 GHz
AZMUTH
H PLANE
VERT. POL'N
PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
EDGE
ANGLE

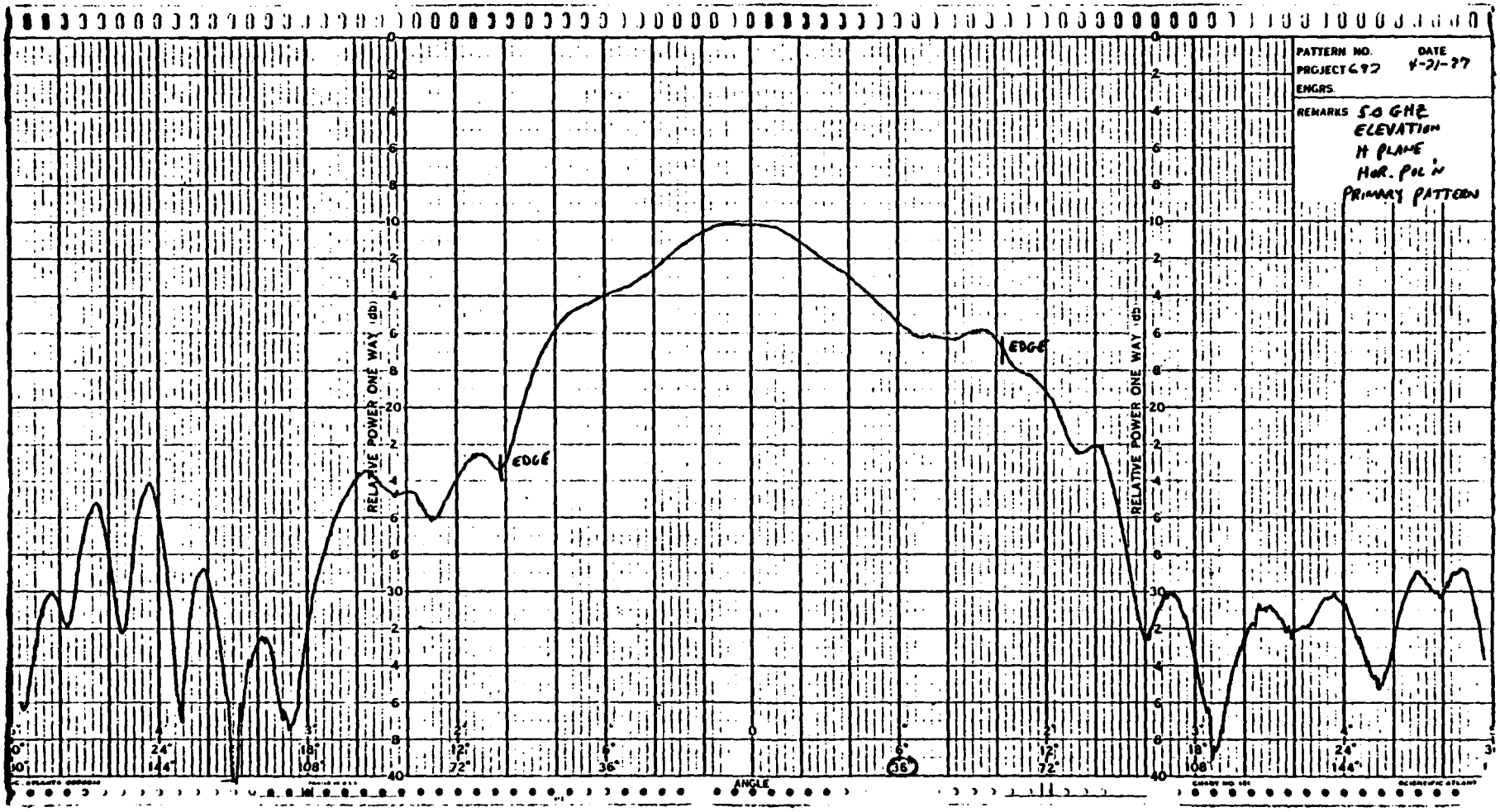

PATTERN NO.
PROJECT 692
ENGRS.
DATE 4-21-77
REMARKS 5.0 GHz
ELEVATION
H PLANE
HOR. POL'N
PRIMARY PATTERN
RELATIVE POWER ONE WAY (db)
EDGE
EDGE
ANGLE

FIGURE 34

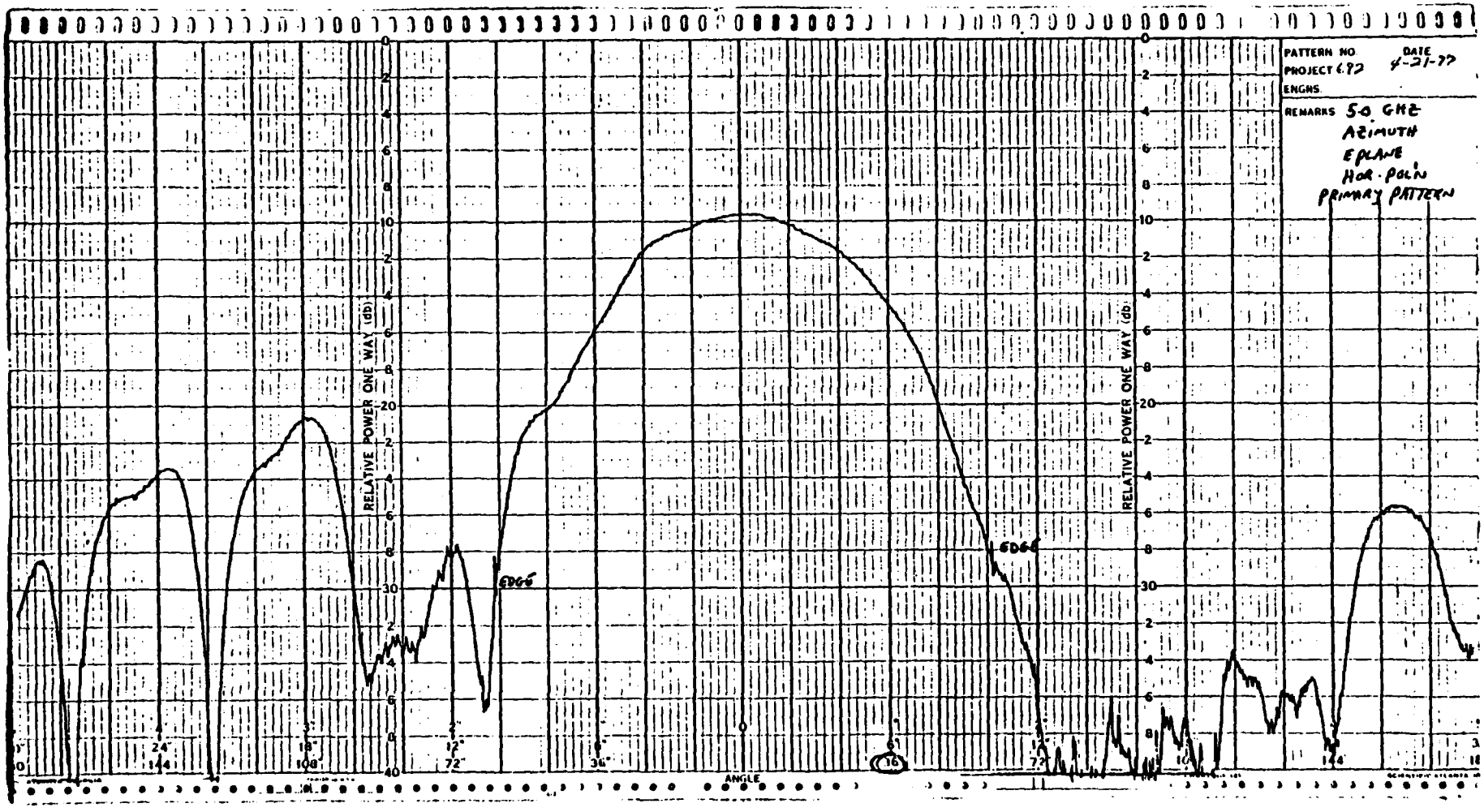

PATTERN NO
PROJECT 692
ENGRS
DATE 4-21-77
REMARKS 5.0 GHz
AZIMUTH
E PLANE
HOR. POL'N
PRIMARY PATTERN
RELATIVE POWER ONE WAY (dB)
EDGE
EDGE
ANGLE

TABLE I

MEASURED VSWR, ISOLATION, PRIMARY PATTERN SUMMARY

VSWR (MAX.) 4.4-5.0 GHz

PORT	FEED #1	FEED #2
SV	1.24	1.21
SH	1.22	1.20
AV	1.22	1.22
AH	1.18	1.24

ISOLATION (MIN.), dB, 4.4-5.0 GHz

PORTS	FEED #1	FEED #2
AH - SH	19.5	20.0
AV - SV	19.4	19.5
AH - AV	34.5	33.0
SH - SV	35.0	32.0
AV - SH	37.5	38.0
SV - AH	35.0	31.5

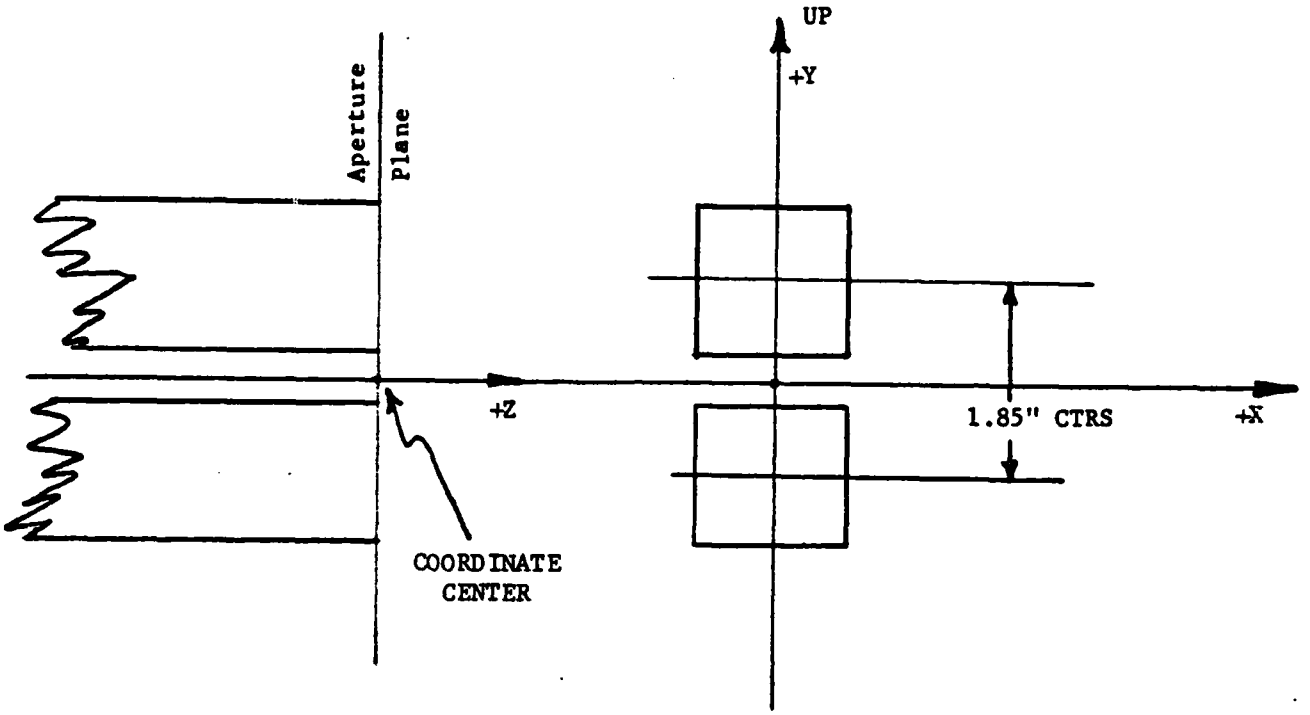
AVERAGE EDGE INTENSITIES (dB), INCL. 2.9 dB SPACE ATTENUATION

	ELEVATION		AZIMUTH	
FREQUENCY MHZ	VERTICAL POLARIZATION	HORIZONTAL POLARIZATION	VERTICAL POLARIZATION	HORIZONTAL POLARIZATION
4400	11.4	7.4	12.4	9.8
4700	11.4	10.5	14.4	18.5
5000	11.4	12.7	11.4	23.0

FIGURE 36

TABLE III

PHASE CENTER MEASUREMENTS



DATA FOR UPPER HORN (TYP.) IN INCHES (X, Y, Z)

FREQUENCY MHZ	HORIZONTAL POLARIZATION	VERTICAL POLARIZATION
4400	0, 0.92, 0.50	0, 1.03, -0.20
4700	0, 0.92, 0.50	0, 1.03, -0.10
5000	0, 0.92, 0.50	0, 1.03, -0.40

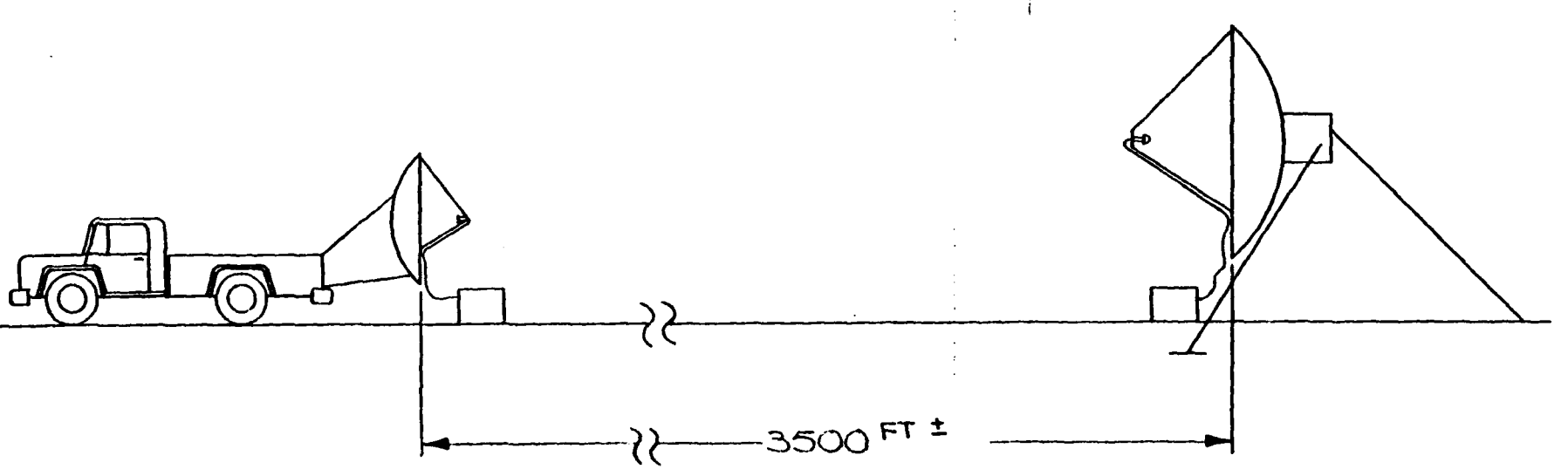
FIGURE 37

TABLE II

MEASURED PEAK VSWR - WAVEGUIDE COMPONENTS

ITEM	SERIAL NO.	PEAK VSWR 4400-5000 MHz
Straight WR187	1	1.04
120" Long	2	1.04
	3	1.05
	4	1.04
	5	1.04
	6	1.035
	7	1.035
	8	1.04
Flexible WR187	1	1.02
60" Long	2	1.04
	3	1.06
	4	1.02
	5	1.03
	6	1.07
	7	1.04
	8	1.05
Flexible WR187	1	1.03
30" Long	2	1.035
	3	1.04
	4	1.045
WR187 Matched Load	---	1.03

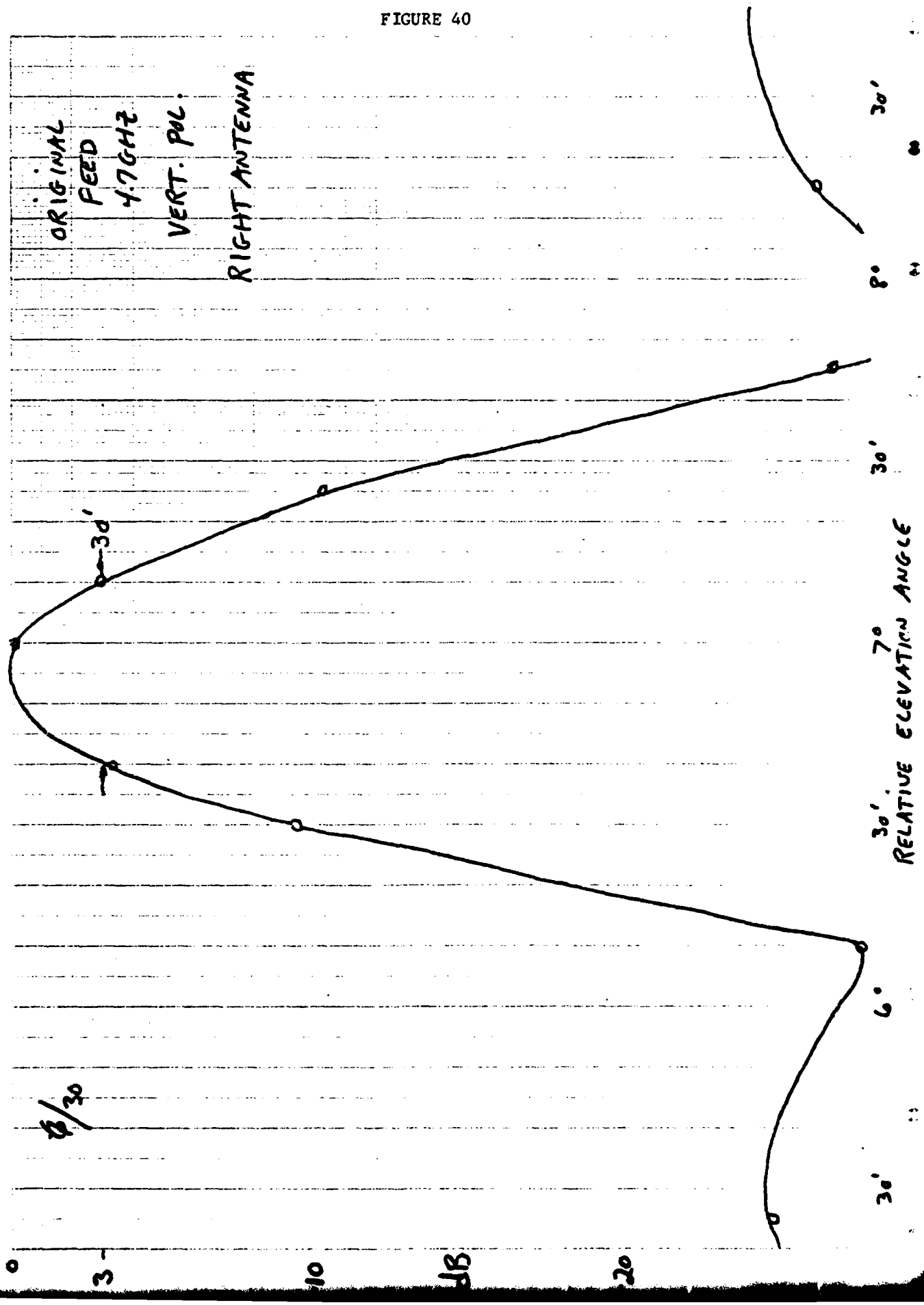
FIGURE 38



ANTENNA PATTERN TEST SETUP

FIGURE 39

FIGURE 40


ORIGINAL
FEED
4.7GHz
VERT. POL.
RIGHT ANTENNA
30'
30'
30'
30'
6°
7°
8°
RELATIVE ELEVATION ANGLE
0
3
10
dB
20

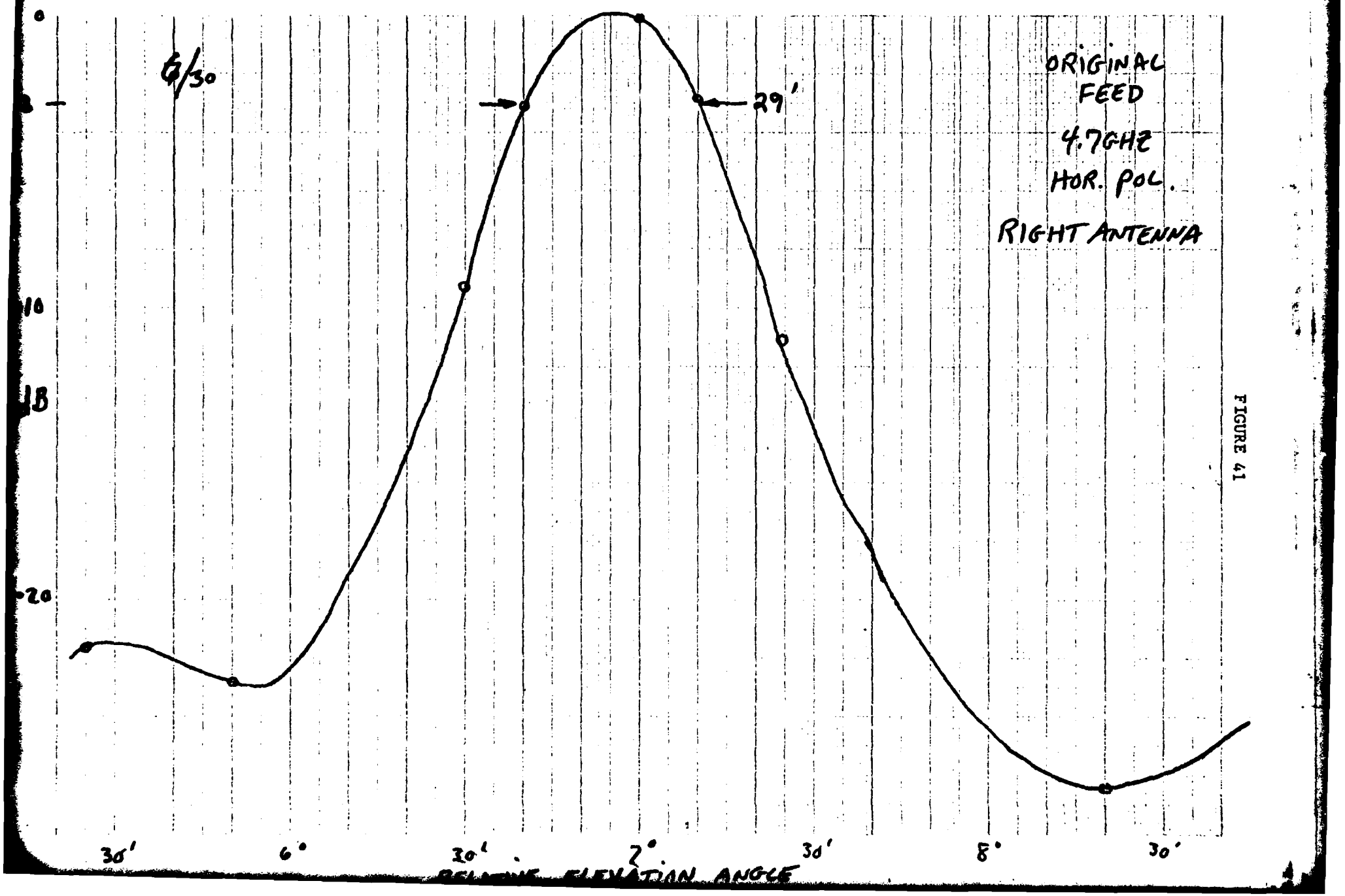

0
10
dB
20
G/30
29'
ORIGINAL
FEED
4.7GHz
HOR. POL.
RIGHT ANTENNA
30'
6°
30'
7°
30'
8°
30'
RELATIVE ELEVATION ANGLE

FIGURE 41

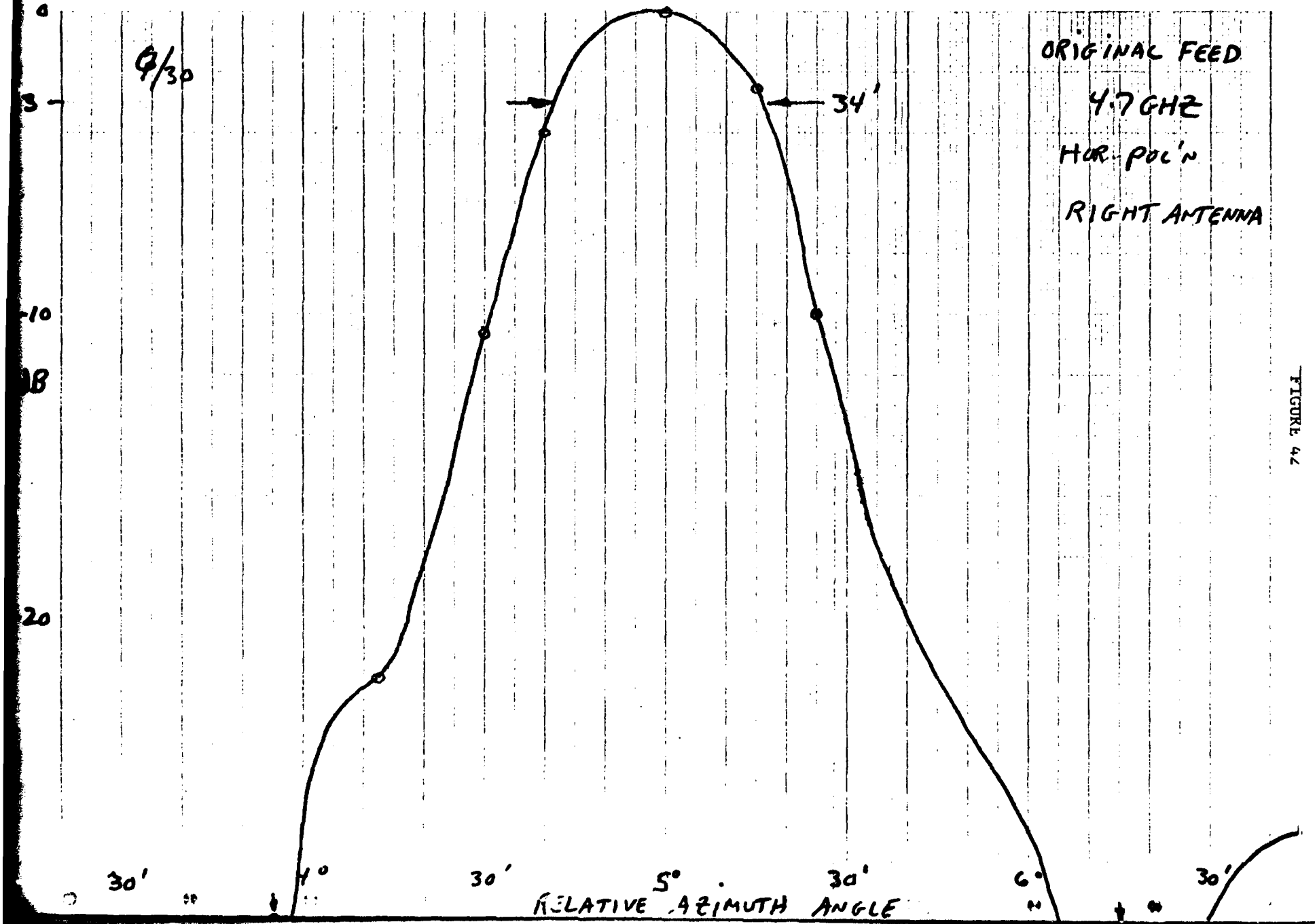

0
-3
-10
-20
dB
φ/30
34'
ORIGINAL FEED
4.7 GHZ
HOR. POL'N
RIGHT ANTENNA
30'
4°
30'
5°
30'
6°
30'
RELATIVE AZIMUTH ANGLE

FIGURE 47

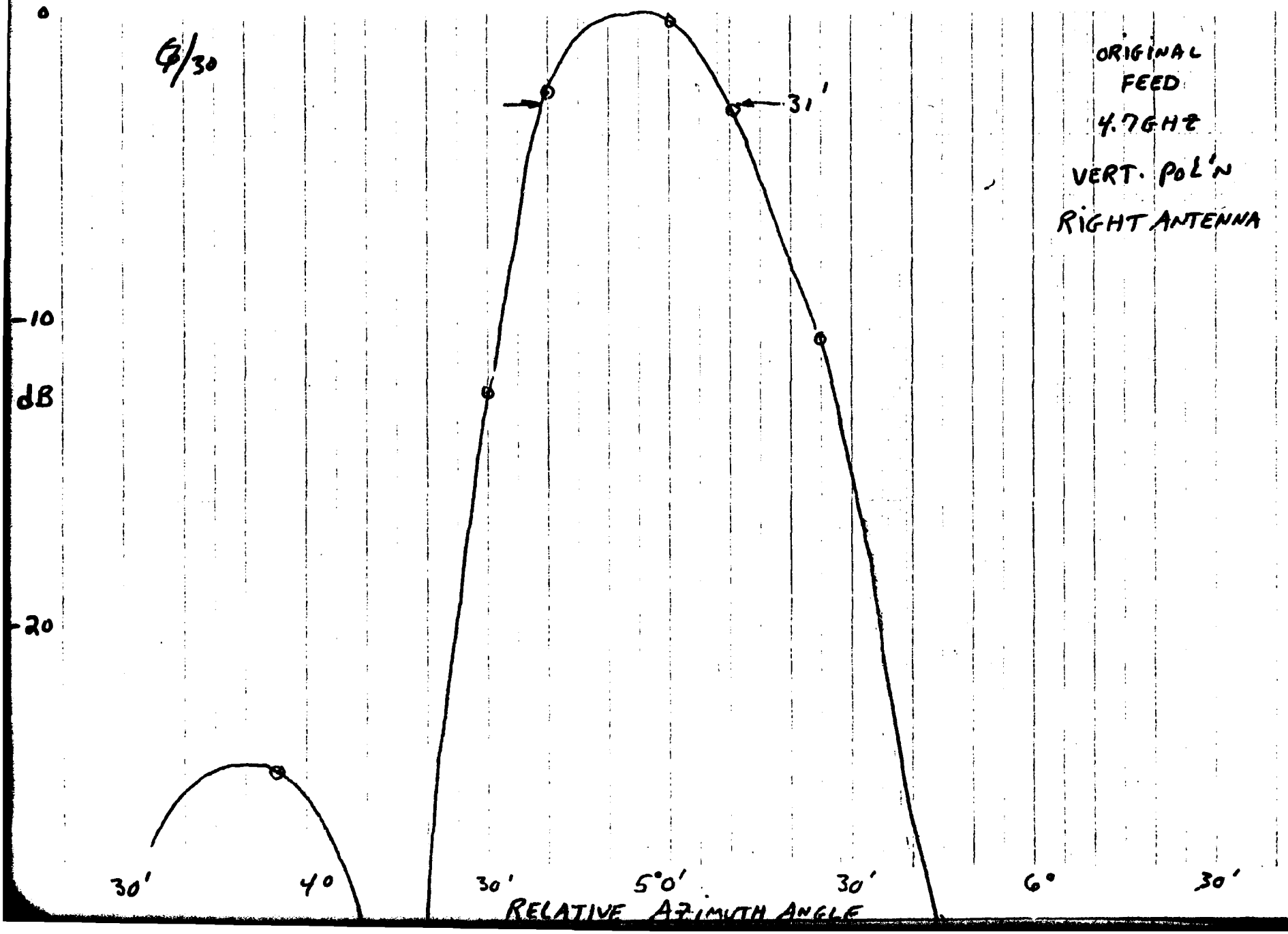

0
-10
dB
-20
G/30
31'
ORIGINAL
FEED
4.7GHz
VERT. POL'N
RIGHT ANTENNA
30'
4°
30'
5°0'
30'
6°
30'
RELATIVE AZIMUTH ANGLE

FIGURE 43

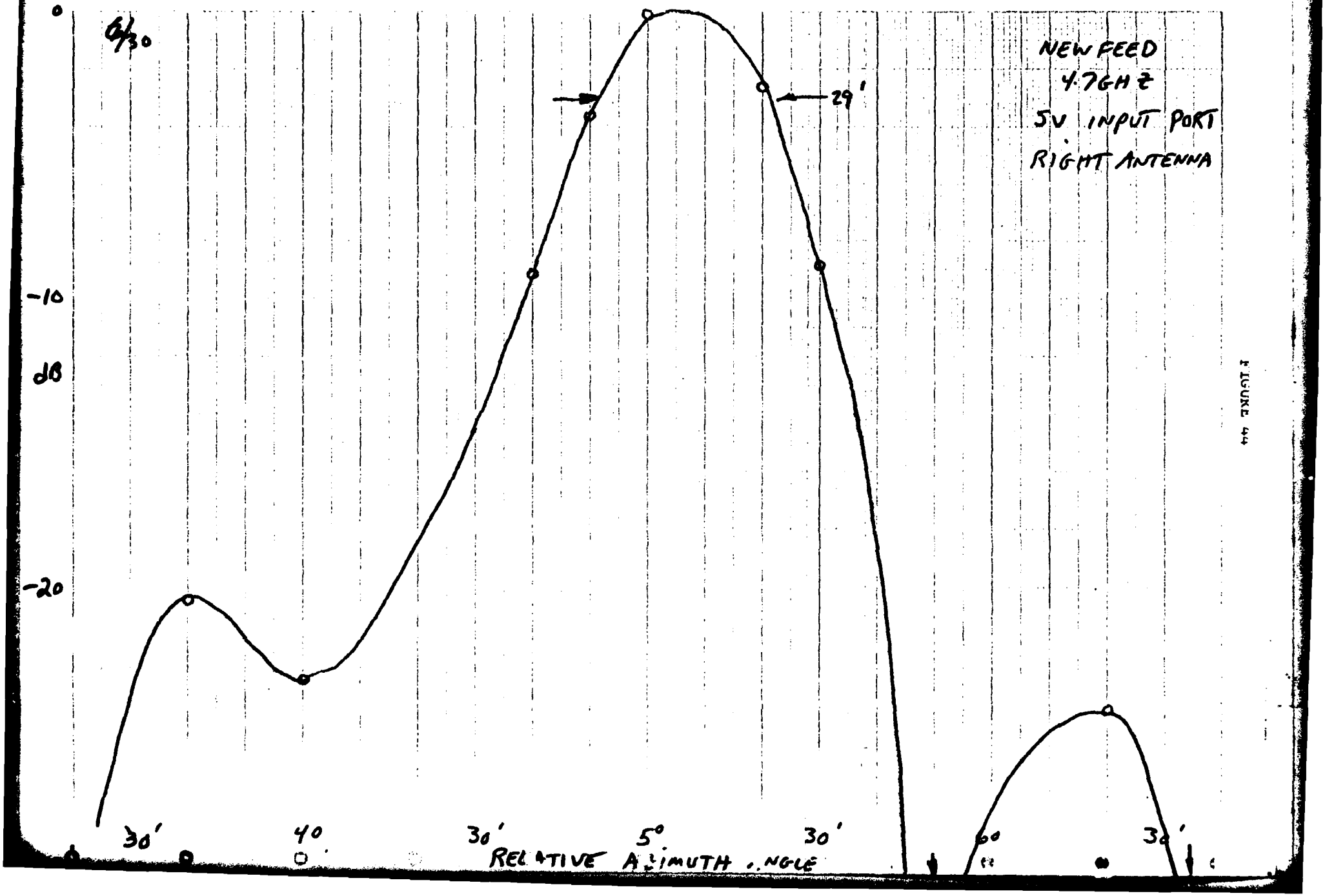
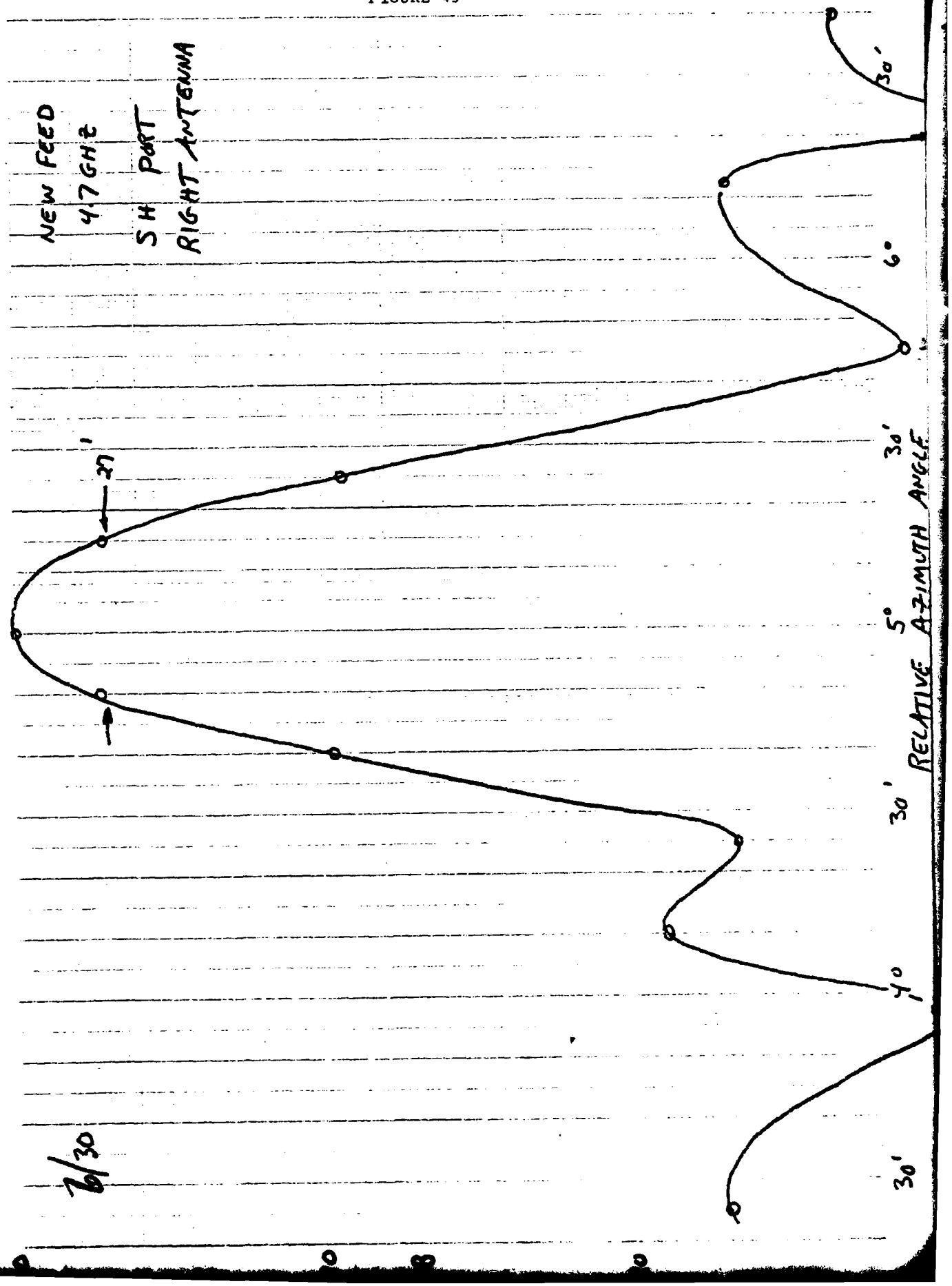

0
G/30
-10
dB
-20
NEW FEED
4.7GHz
5V INPUT PORT
RIGHT ANTENNA
29'
30'
40
30'
5°
30'
60
30'
RELATIVE AZIMUTH ANGLE

FIGURE 44

FIGURE 45


NEW FEED
4.7 GHZ
SH PORT
RIGHT ANTENNA
27'
30'
6°
30'
5°
30'
4°
30'
RELATIVE AZIMUTH ANGLE
6/30

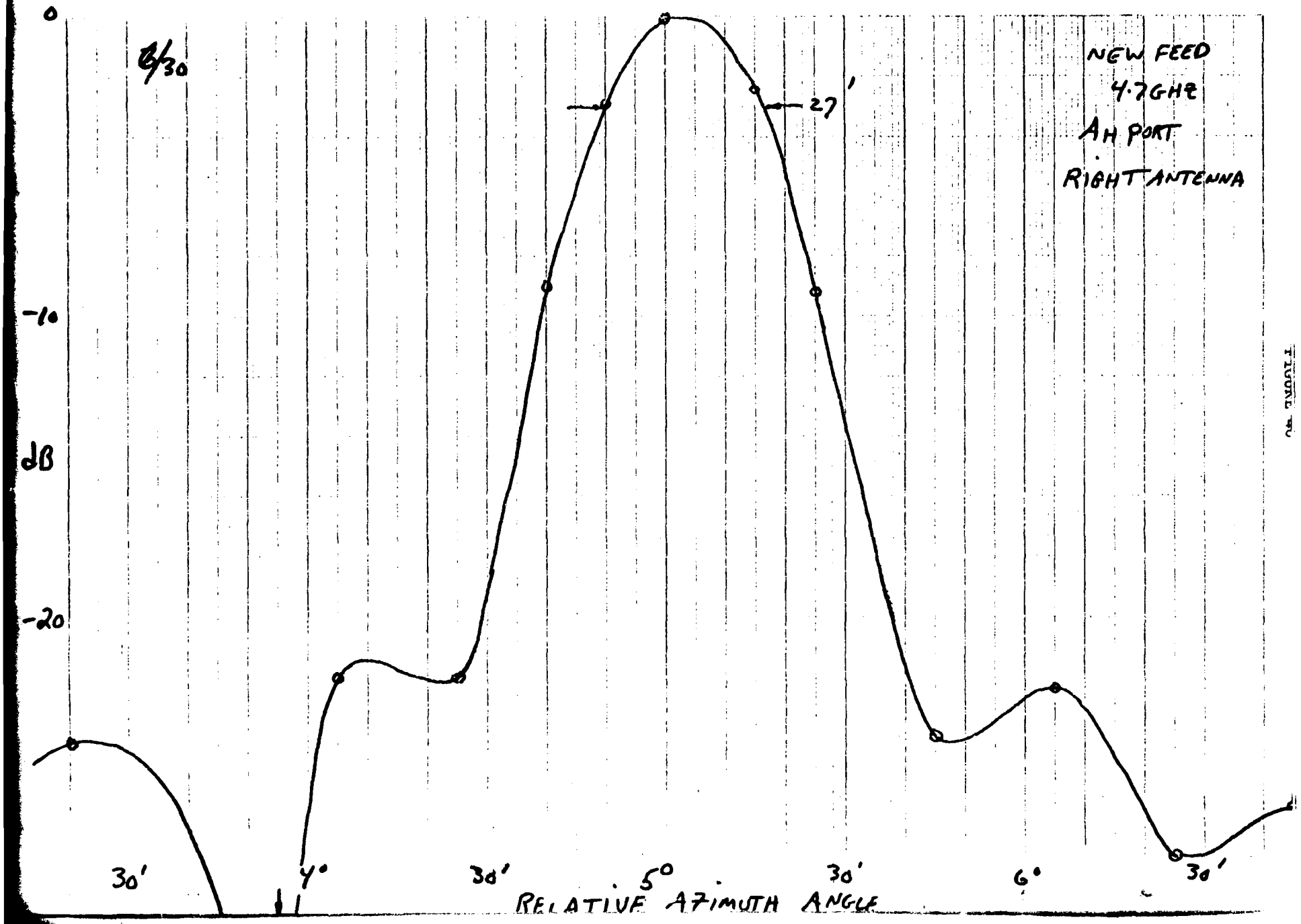
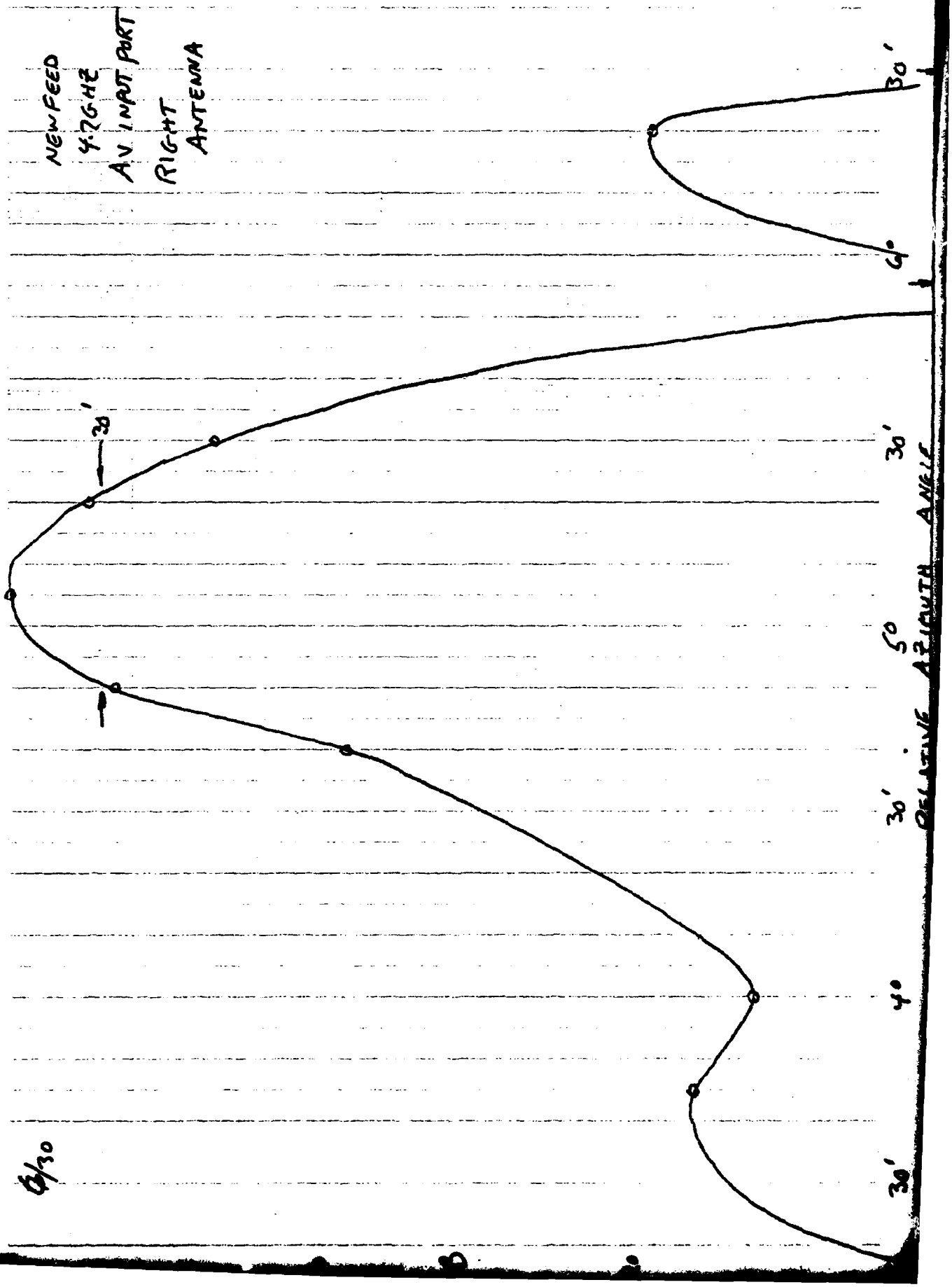

0
-10
-20
dB
B/30
27'
NEW FEED
4.7GHz
AH PORT
RIGHT ANTENNA
30'
4°
30'
5°
30'
6°
30'
RELATIVE AZIMUTH ANGLE

FIGURE 47


NEW FEED
4.7GHz
AV INPUT PORT
RIGHT
ANTENNA
30'
4°
30'
5°
30'
4°
30'
RELATIVE AZIMUTH ANGLE
6/30

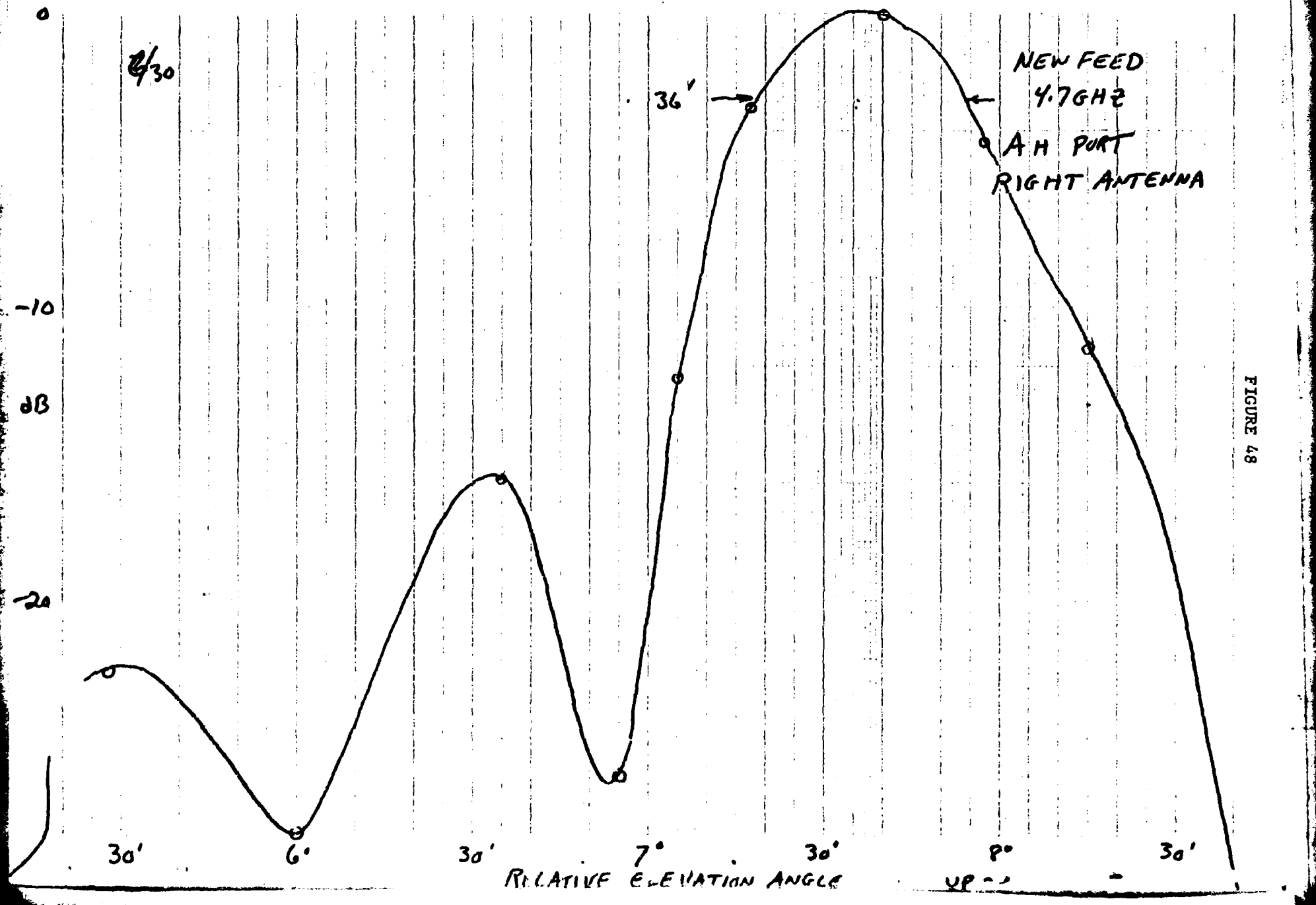
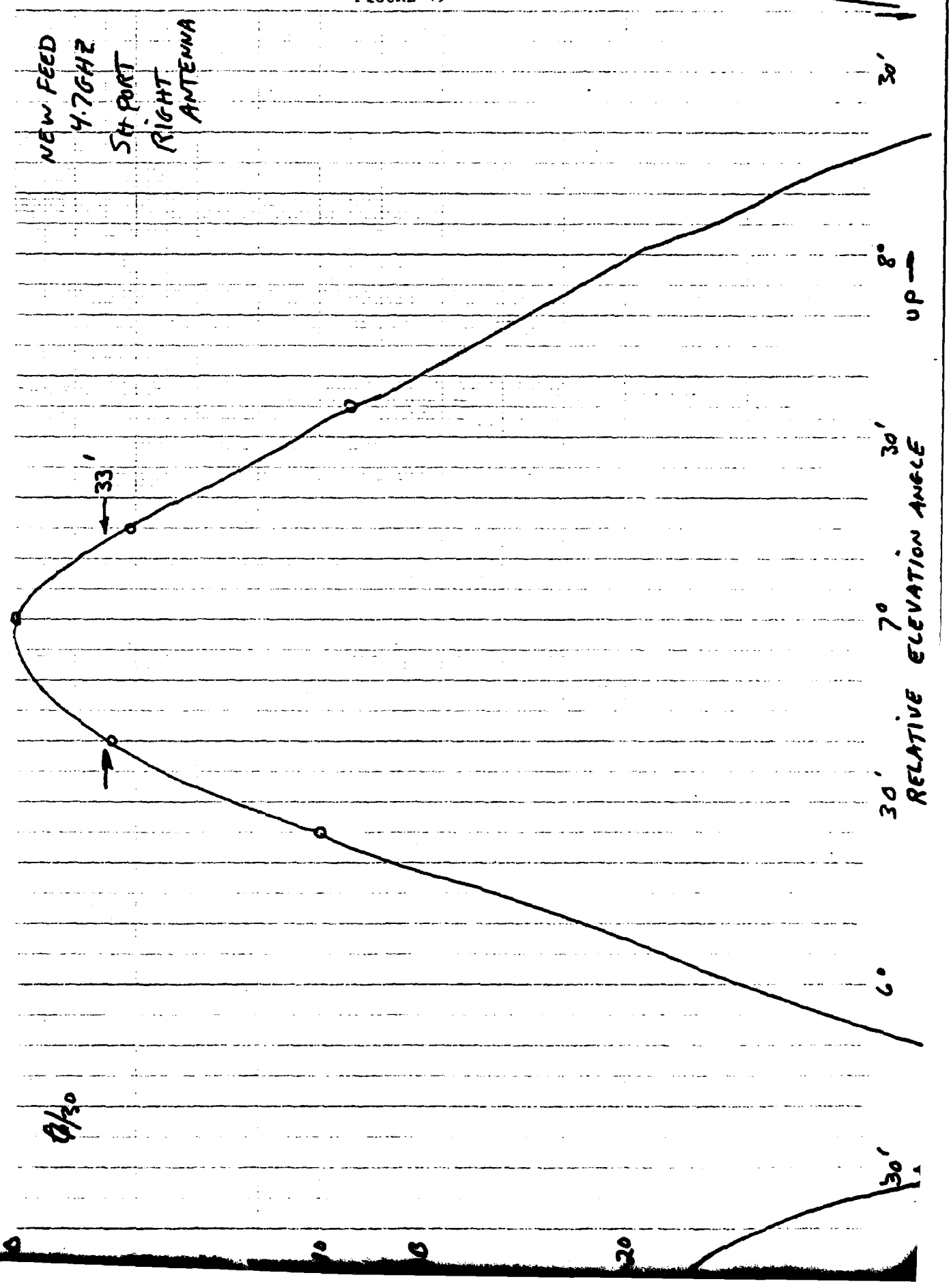

0
-10
dB
-20
36'
NEW FEED
4.7GHz
AH PORT
RIGHT ANTENNA
30'
6°
30'
7°
30'
8°
30'
RELATIVE ELEVATION ANGLE
UP

FIGURE 48

FIGURE 49


NEW FEED
4.7GHZ
SH PORT
RIGHT
ANTENNA
33'
30'
8°
UP
30'
7°
30'
6°
RELATIVE ELEVATION ANGLE
30'
20

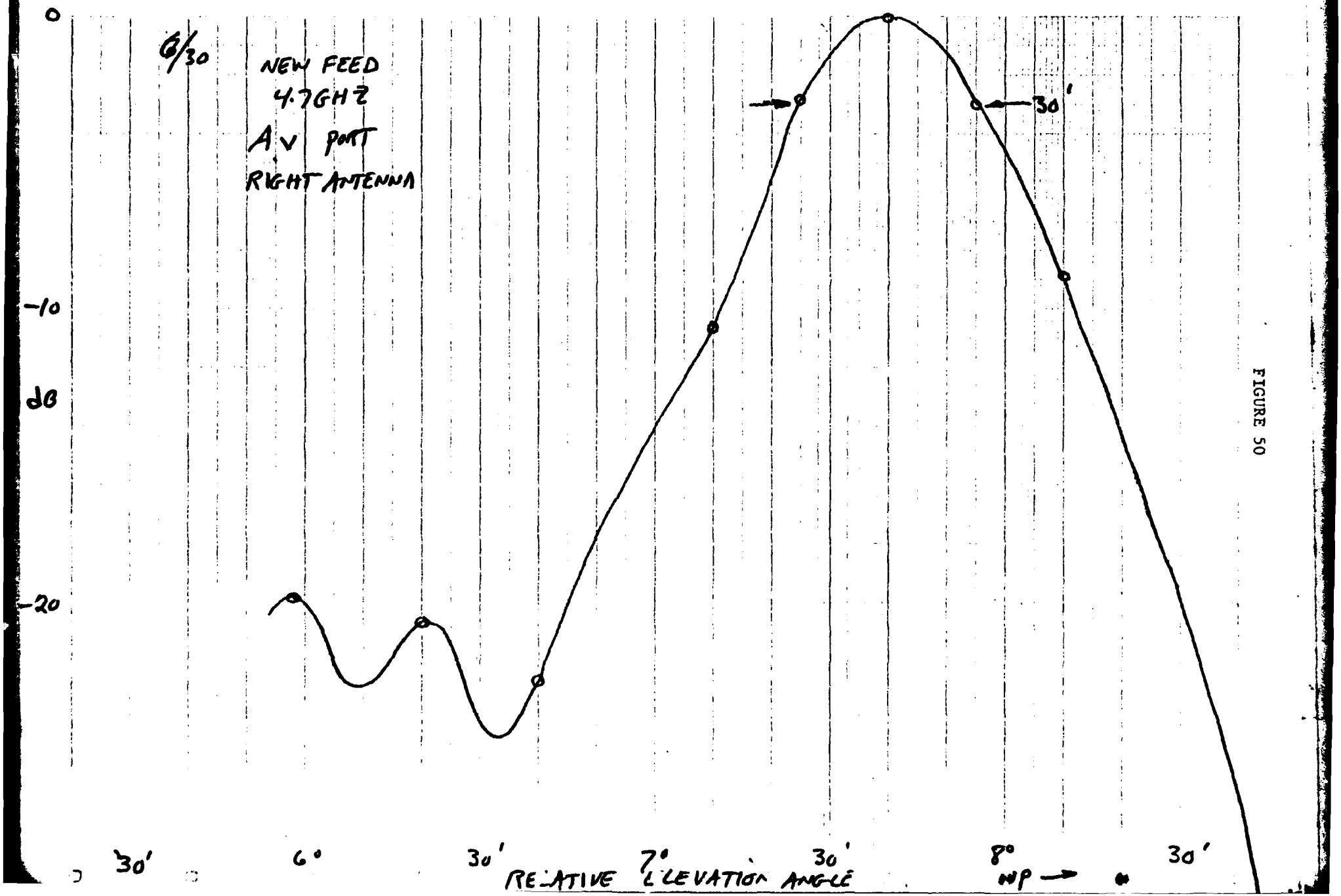
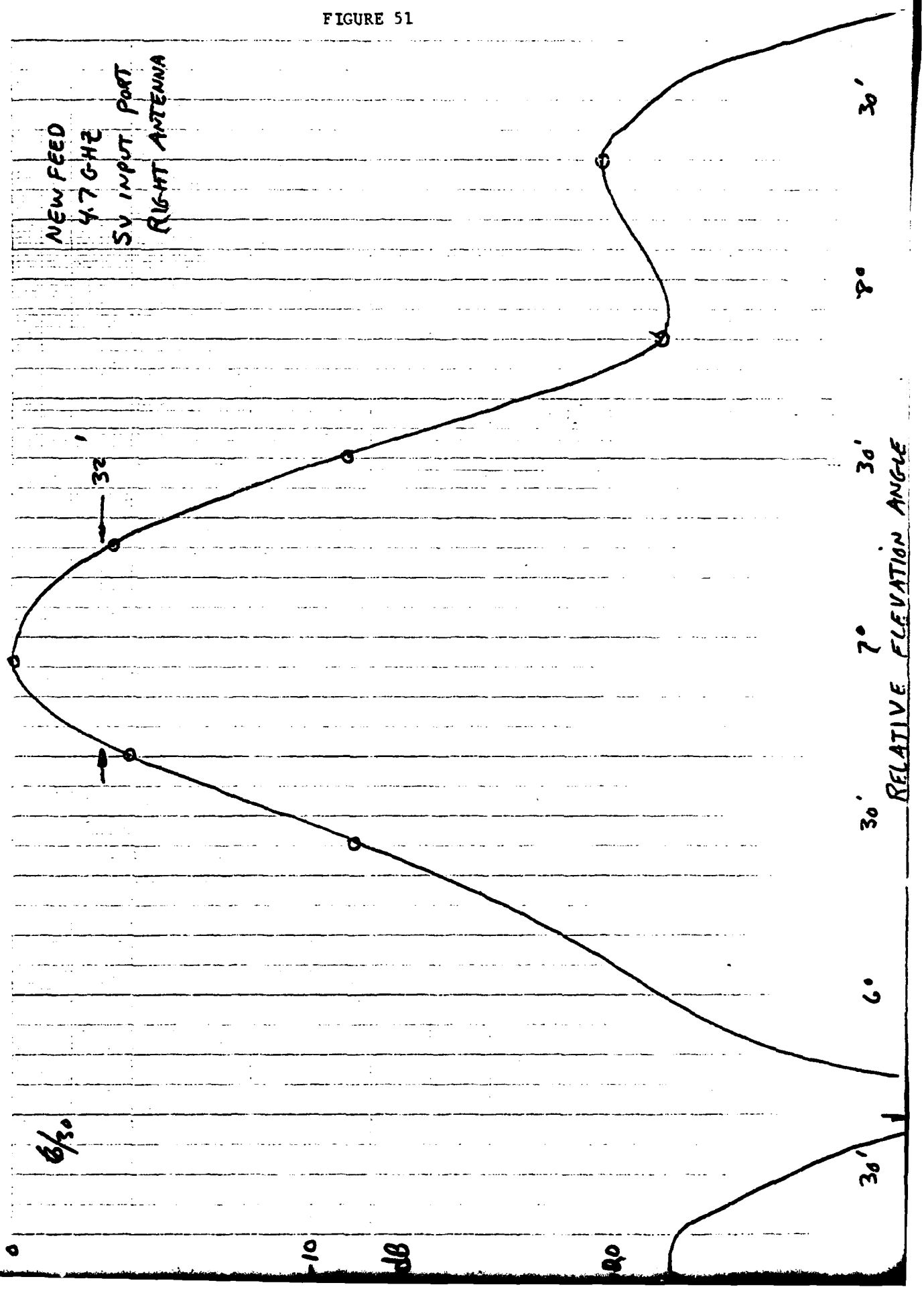

0
-10
dB
-20
6/30
NEW FEED
4.7GHZ
AV PORT
RIGHT ANTENNA
30'
30'
30'
30'
6°
7°
8°
RELATIVE ELEVATION ANGLE
NP

FIGURE 50

FIGURE 51


NEW FEED
4.7 GHZ
SV INPUT PORT
RIGHT ANTENNA
32'
6/30
0
10
dB
20
30'
6°
30'
7°
30'
8°
30'
RELATIVE ELEVATION ANGLE

NO. 315. 10 DIVISIONS PER INCH BOTH WAYS 70 BY 100 DIVISIONS
IN STOCK DIRECT FROM CODEX BOOK CO NORWOOD, MASS. 02062
PRINTED

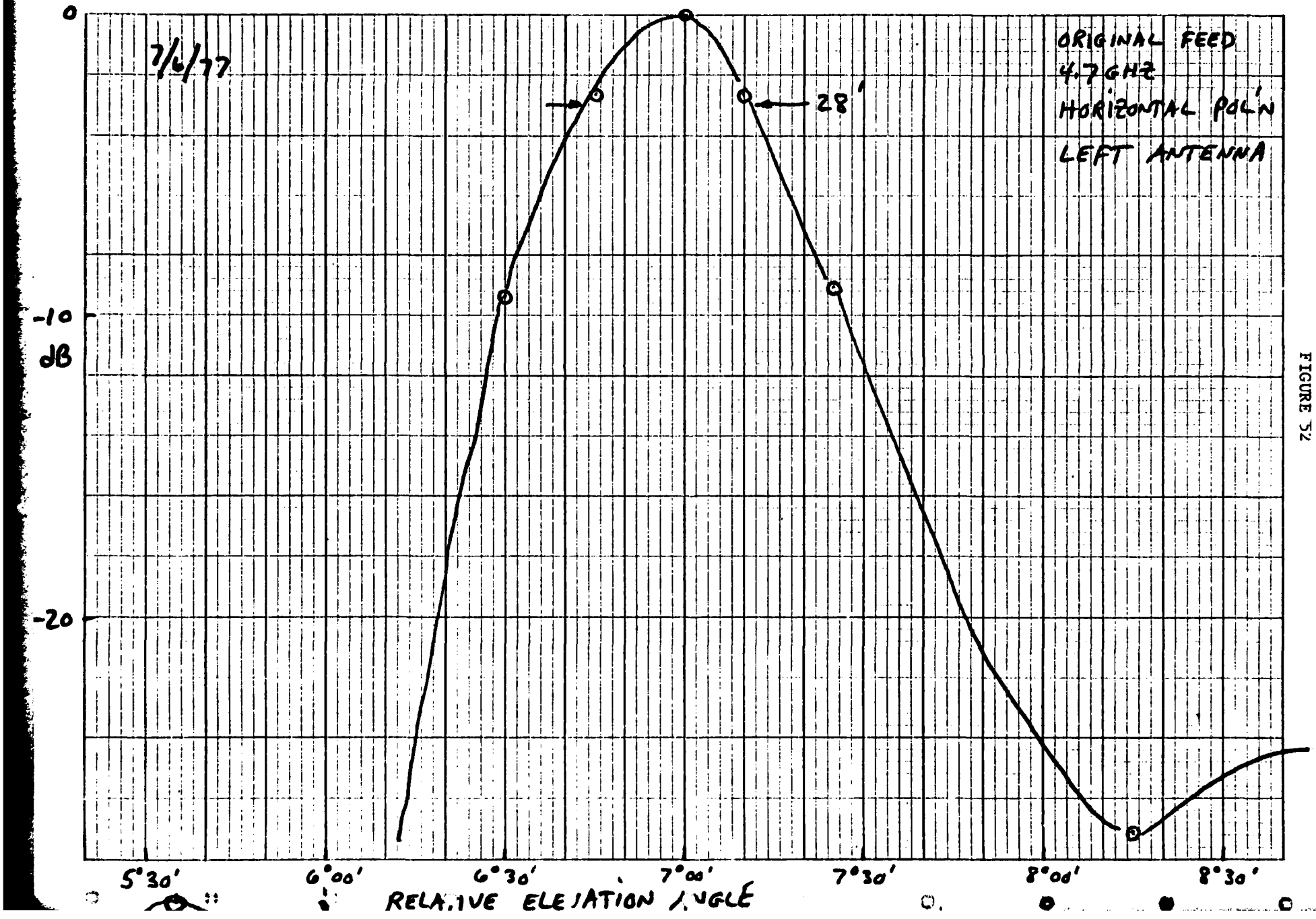
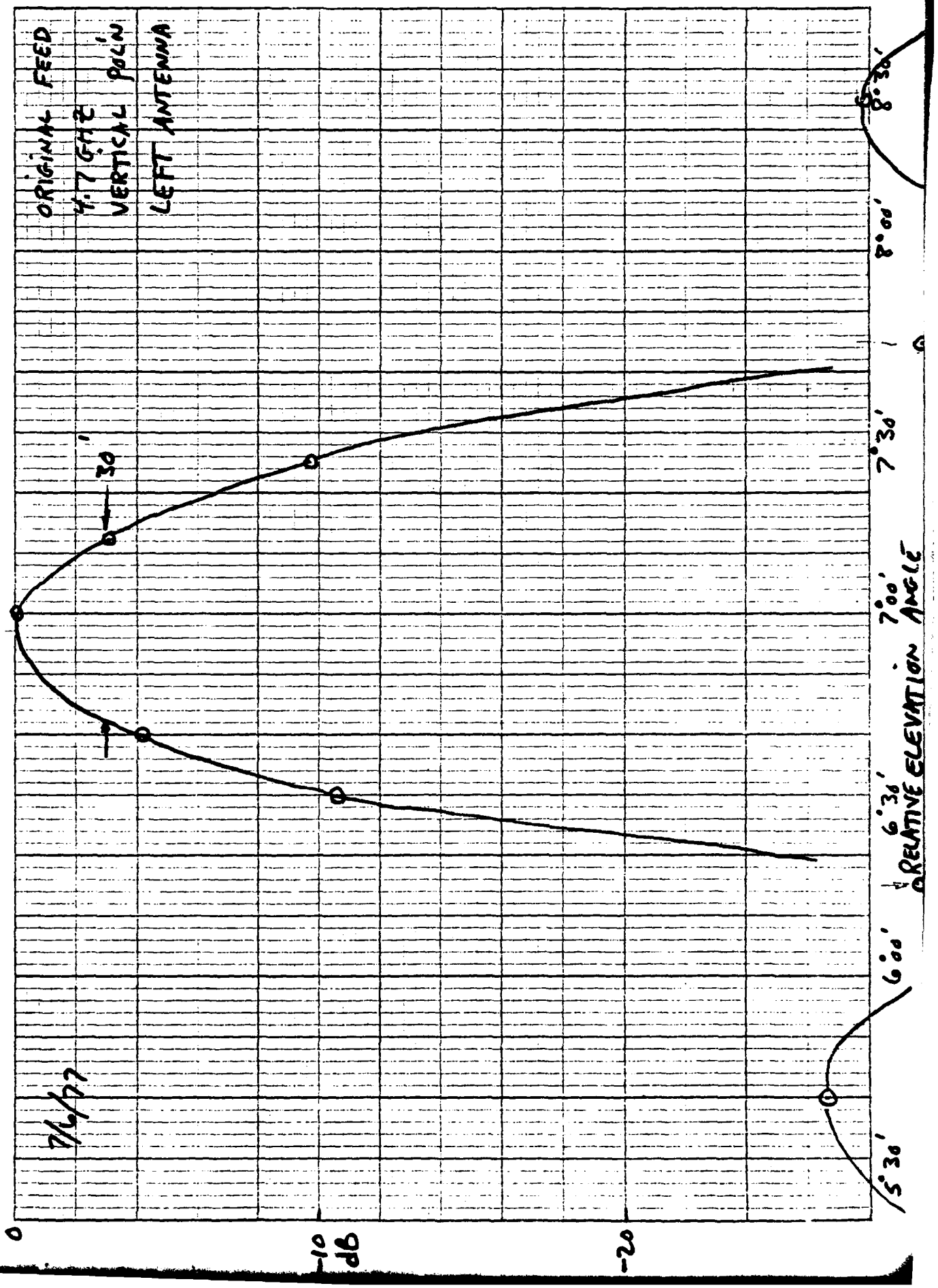


FIGURE 52

FIGURE 53


ORIGINAL FEED
4.7 GHz
VERTICAL POL'N
LEFT ANTENNA
30'
7/6/77
0
-10
dB
-20
5°30'
6°00'
6°30'
7°00'
7°30'
8°00'
8°30'
RELATIVE ELEVATION ANGLE

IN STOCK DIRECT FROM CRUCE BOOK CO. NORWOOD MASS 02062

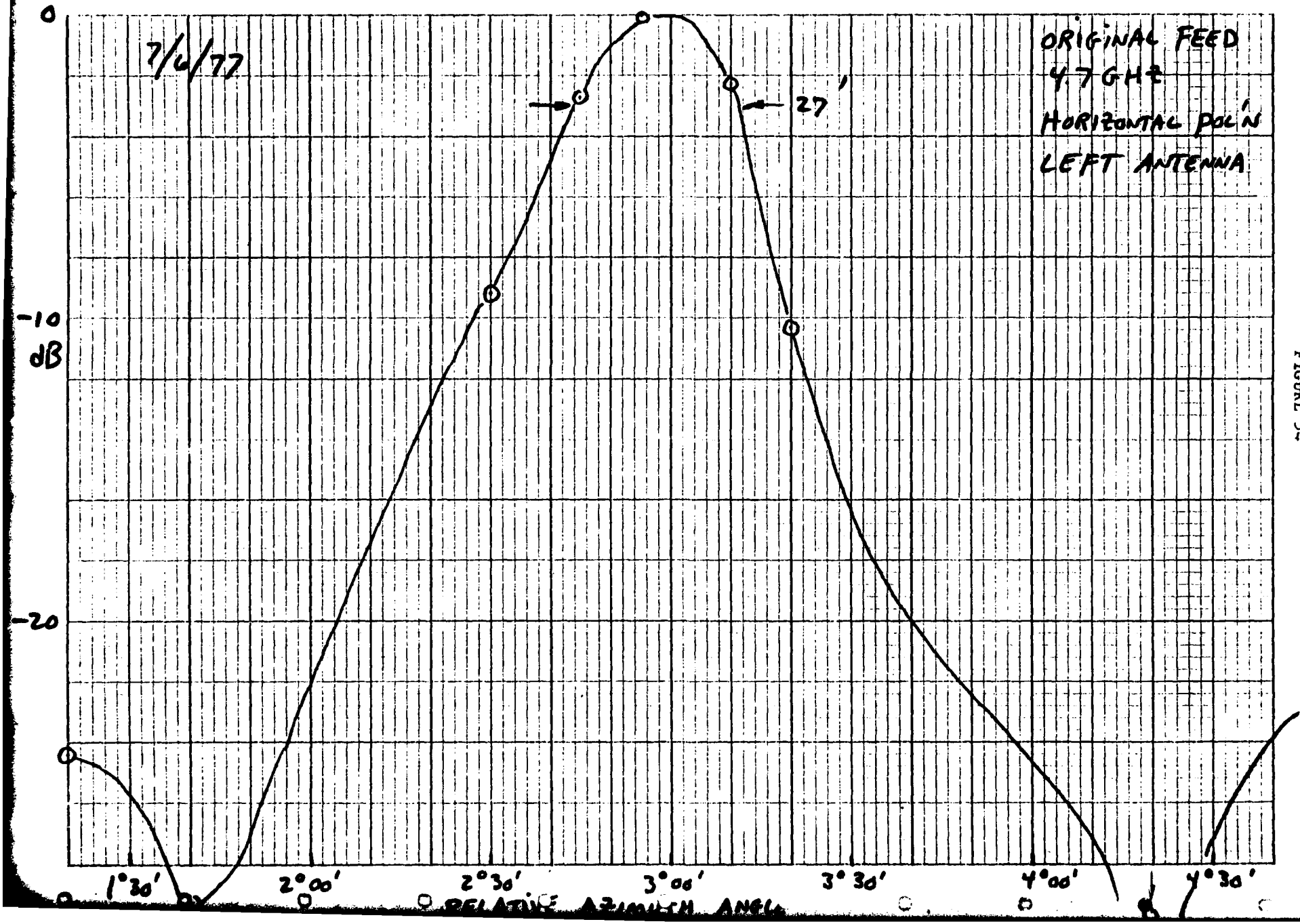
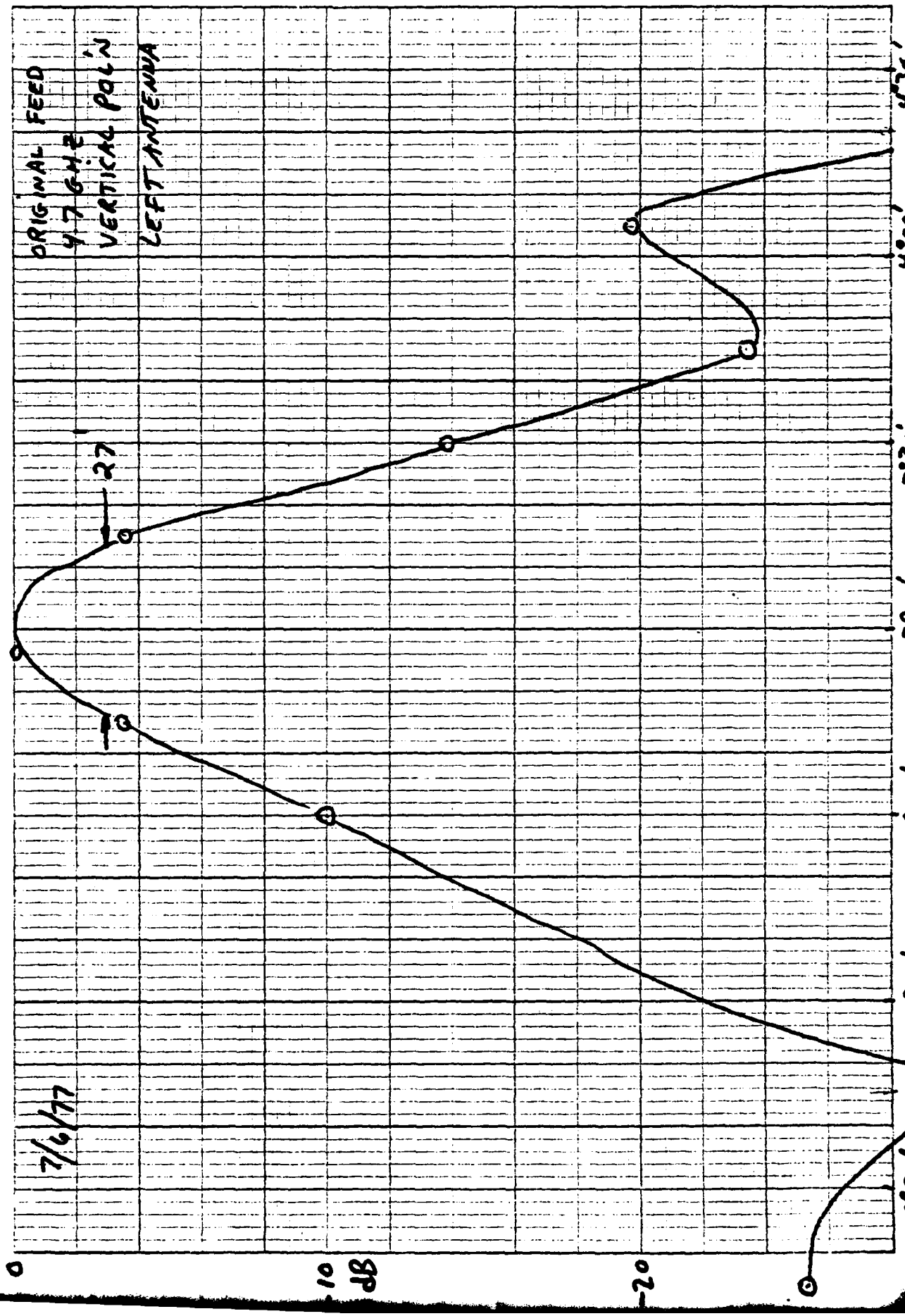


FIGURE 55


ORIGINAL FEED
4.7 GHZ
VERTICAL PLN
LEFT ANTENNA
7/6/77
27
0
10
20
dB
1°30'
2°00'
2°30'
3°00'
3°30'
4°00'
4°30'

NO 315. 10 DIVISIONS PER INCH BOTH WAYS 70 BY 100 DIVISIONS IN STOCK DIRECT FROM CODEX BOOK CO. NORWOOD, MASS 02062

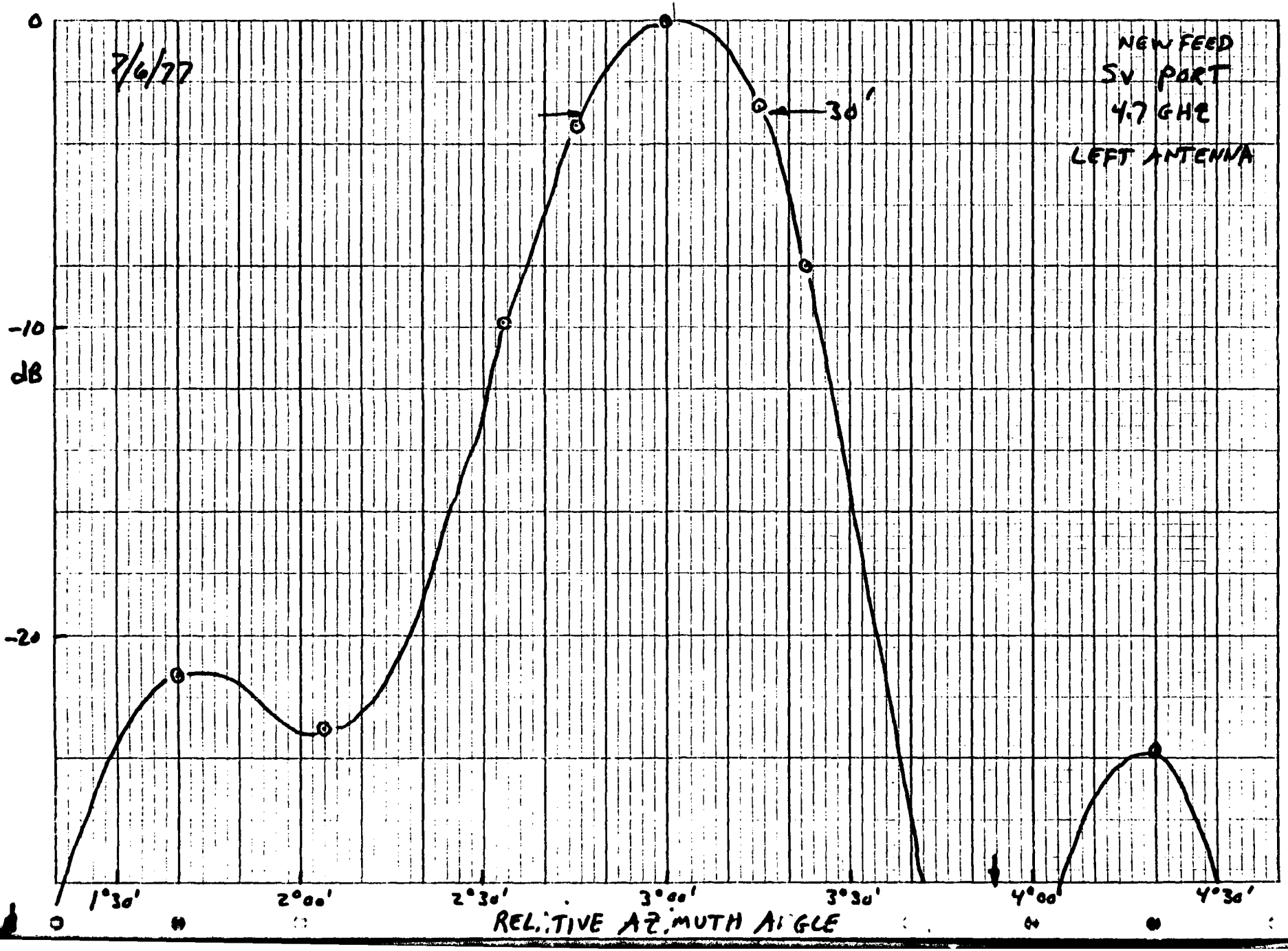


FIGURE 30

7/4/77
NEW FEED
4.7 GHz
SH PORT
LEFT ANTENNA
28'
0
10
dB
20
1°30'
2°00'
2°30'
3°00'
3°30'
4°00'
4°30'
RELATIVE AZIMUTH ANGLE

NO. 375. 10 DIVISIONS PER IN. H BOTH WAYS 72 BY 120 DIVISIONS
IN STOCK DIRECT FROM CODEX BOOK CO. NORWOOD, MASS. 02062

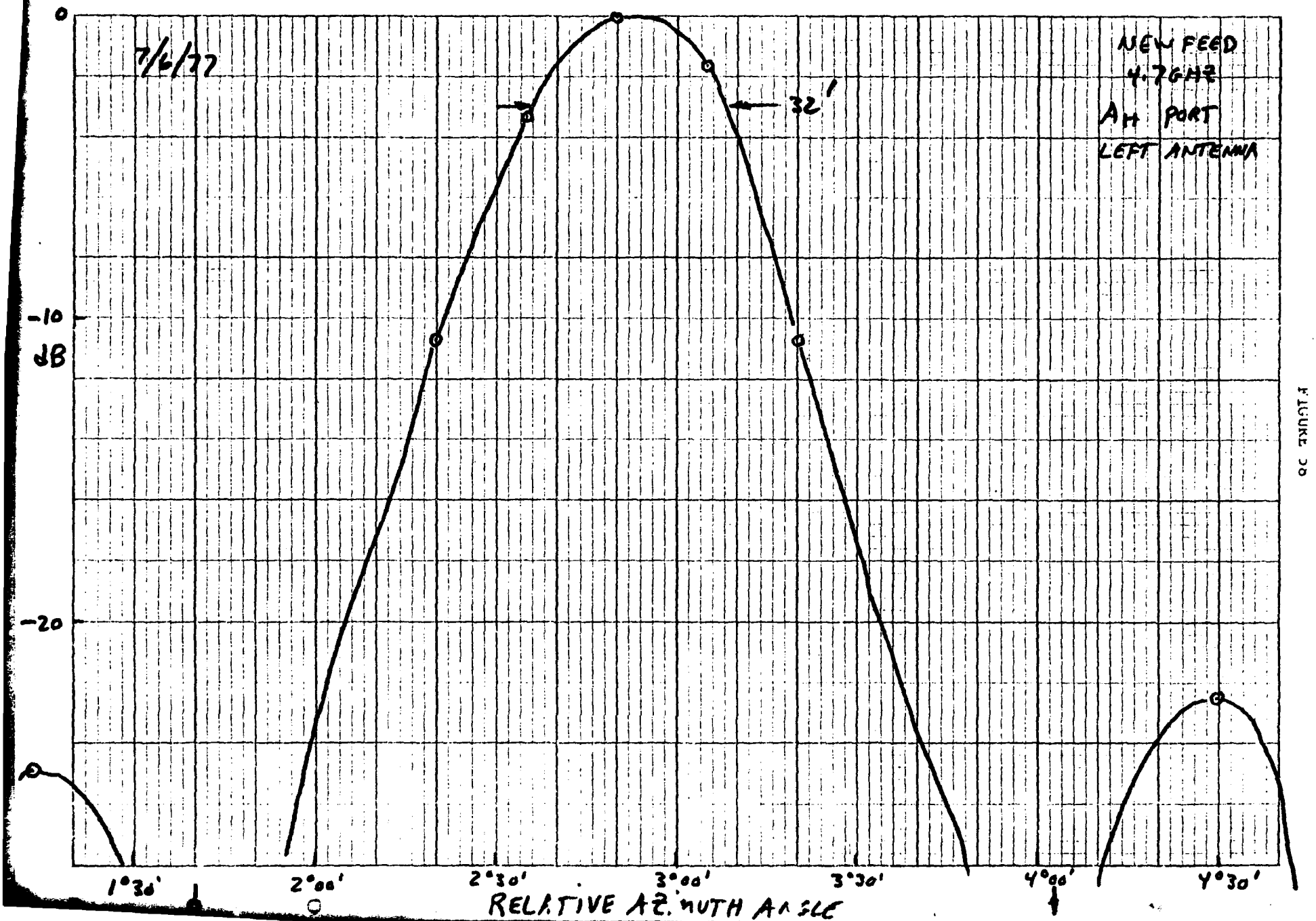
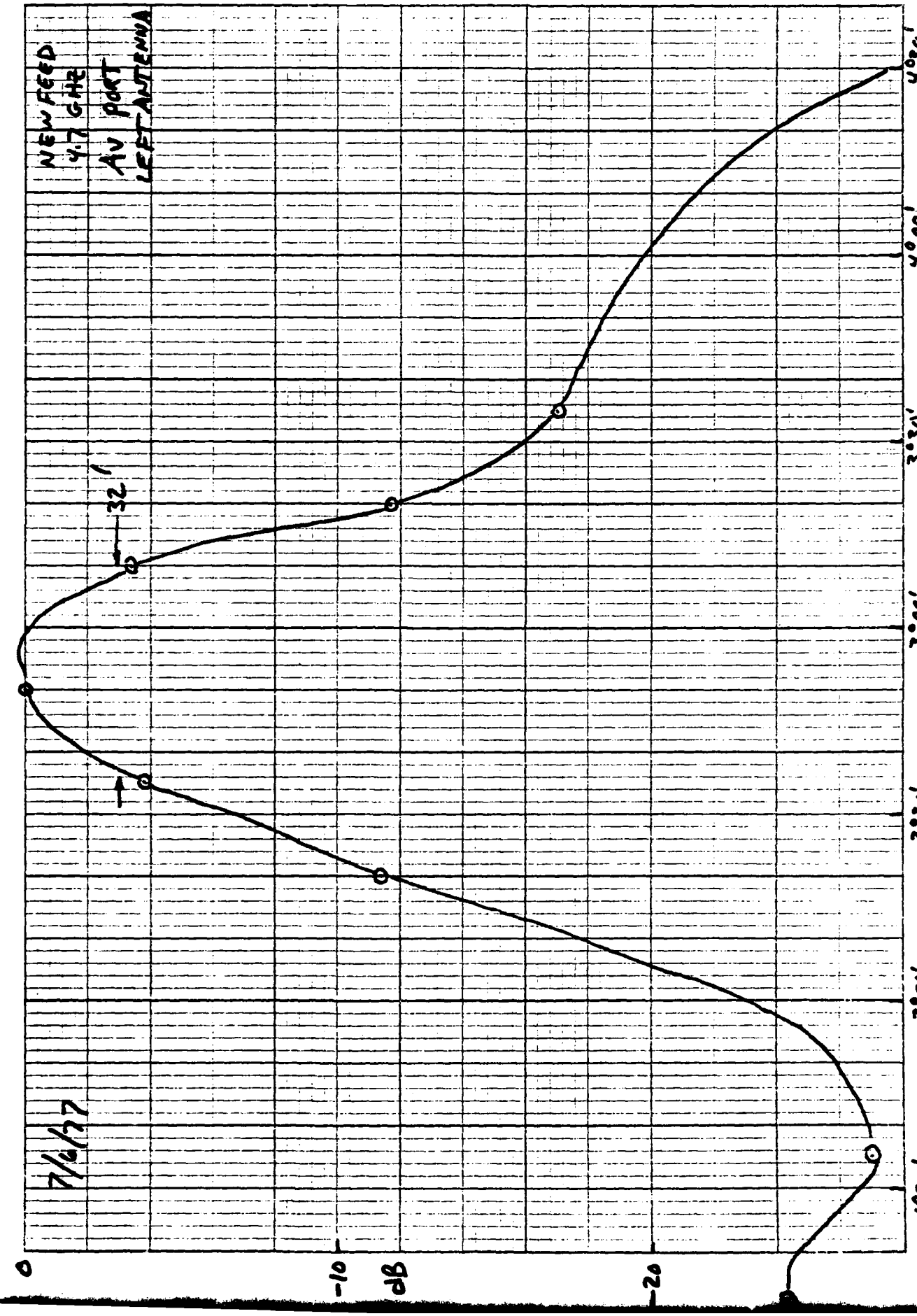


FIGURE 20

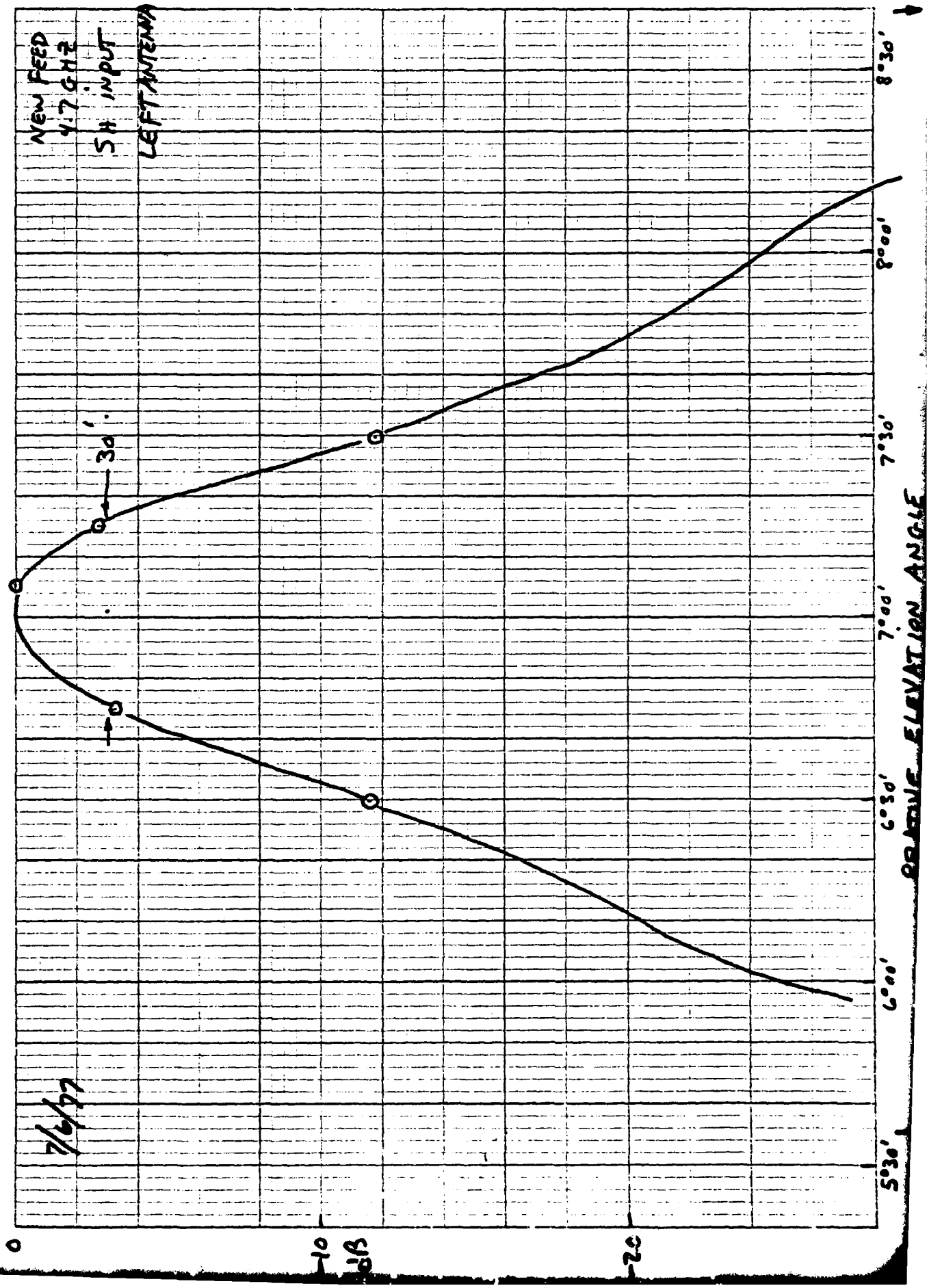
FIGURE 59


NEW FEED
4.7 GHz
AV PORT
LEFT ANTENNA
7/6/77
-32'
0
-10
dB
-20
1°30'
2°00'
2°30'
3°00'
3°30'
4°00'
4°30'
RELATIVE AZIMUTH ANGLE

NO 315. 10 DIVISIONS PER INCH BOTH WAYS 20 BY 100 DIVISIONS
KEUFFEL & ESSER CO. PAPER IN STOCK DIRECT FROM COLLEX BOOK CO. FRONT NORWOOD, MASS. 02062

FIGURE 60

FIGURE 61


NEW FEED
4.7 GHZ
SH INPUT
LEFT ANTENNA
30'
7/6/77
0
10
20
5°30'
6°00'
6°30'
7°00'
7°30'
8°00'
8°30'
RELATIVE ELEVATION ANGLE

NO. 315 10 DIVISIONS PER INCH BOTH WAYS 70 BY 100 DIVISIONS IN STOCK DIRECT FROM CODEX BOOK CO NORWOOD, MASS. 02062

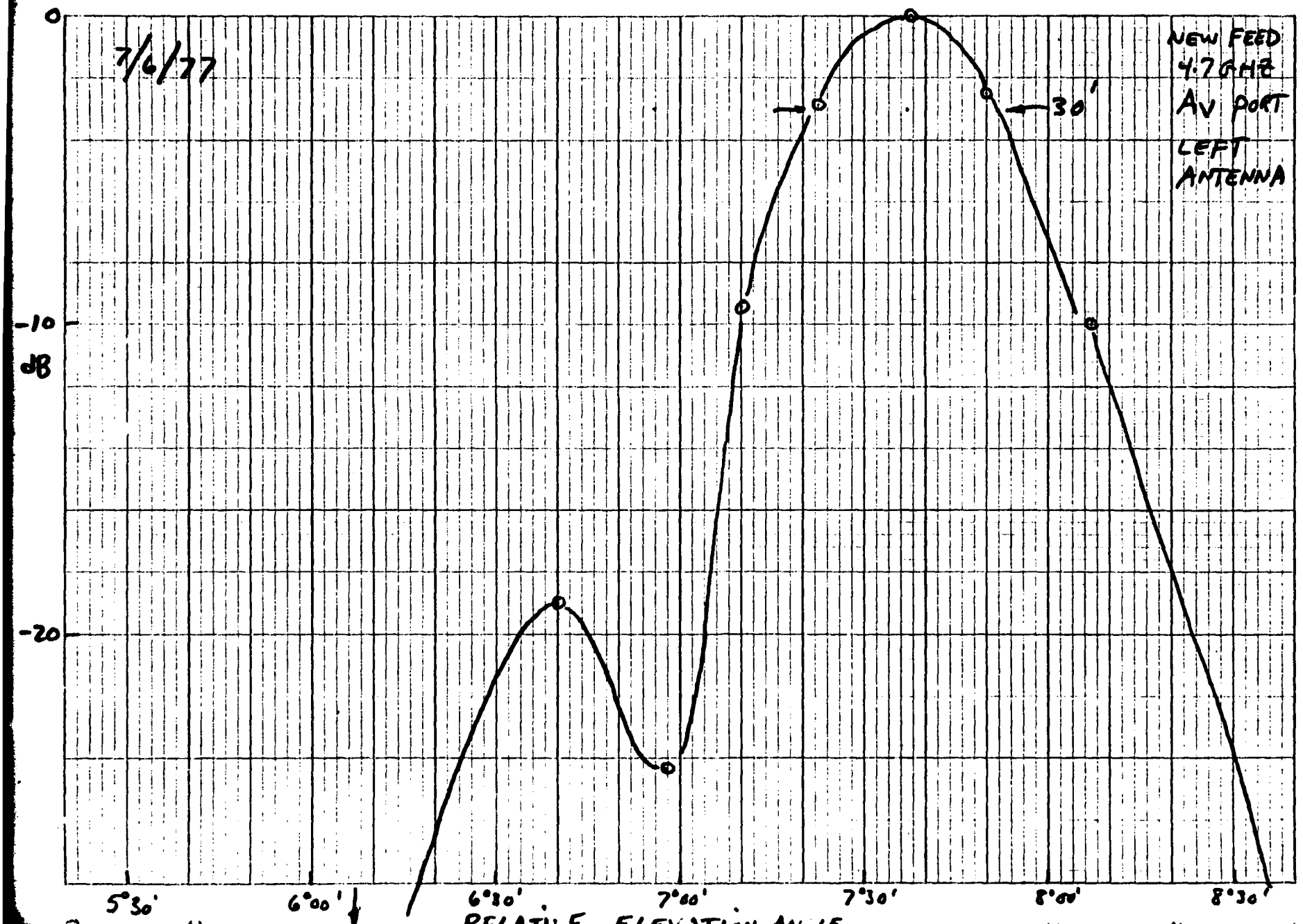
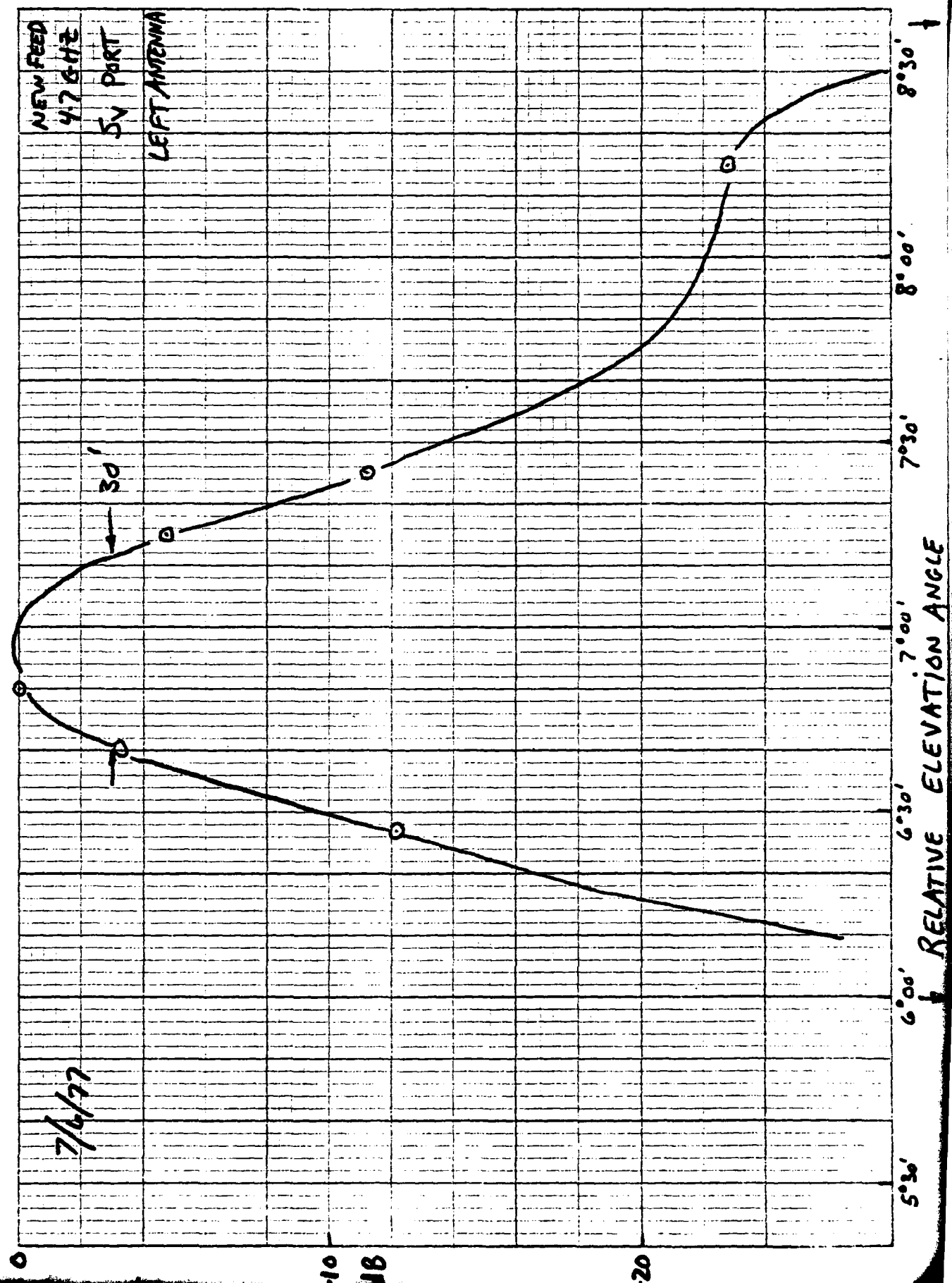
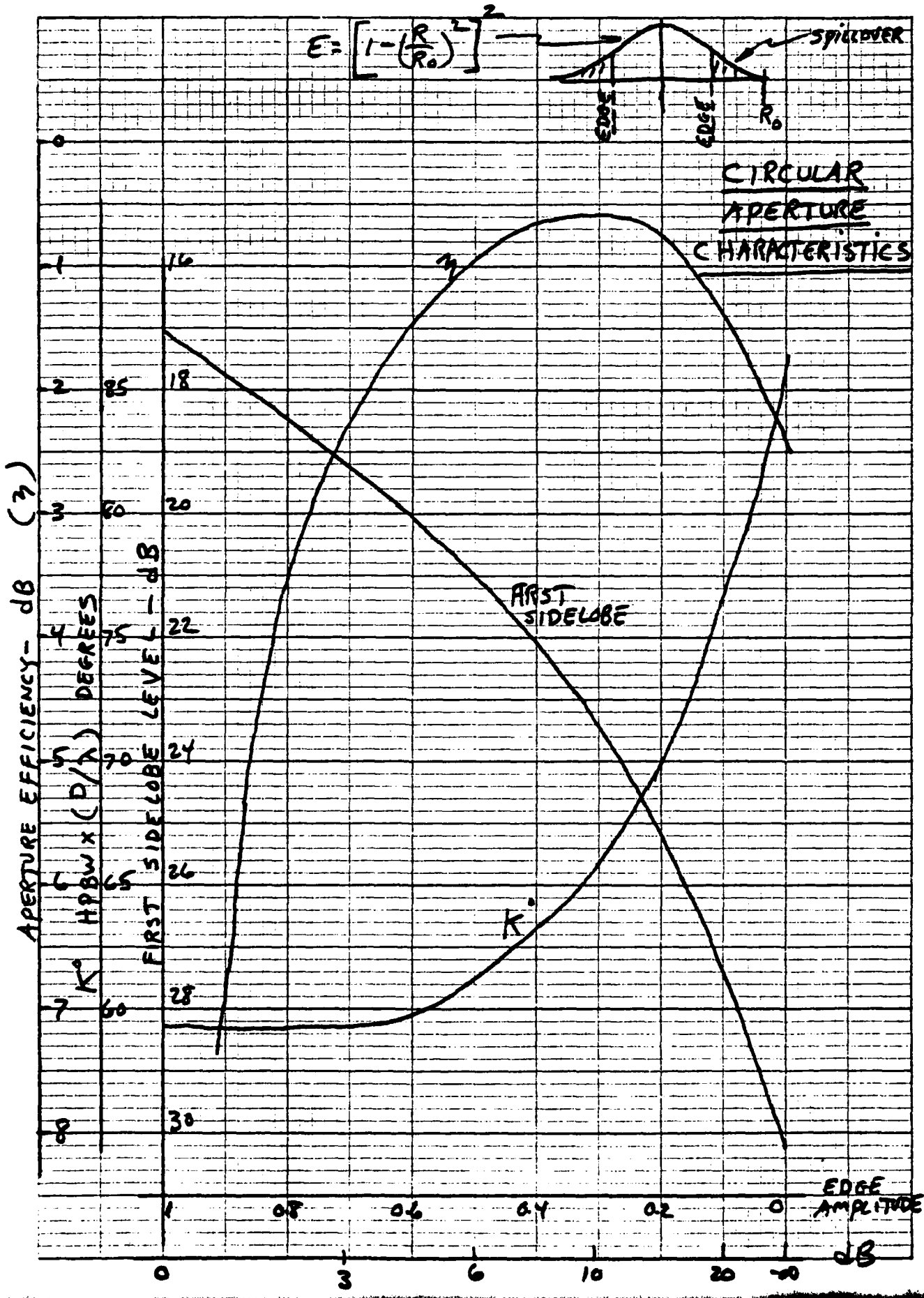


FIGURE 62

FIGURE 63


NEW FEED
4.7 GHz
5V PORT
LEFT ANTENNA
30'
7/4/77
0
-10
dB
-20
5°30'
6°00'
6°30'
7°00'
7°30'
8°00'
8°30'
RELATIVE ELEVATION ANGLE



$E = \left[1 - \left(\frac{R}{R_0}\right)^2\right]^2$
SPILLOVER
EDGE
EDGE
R_0
CIRCULAR APERTURE CHARACTERISTICS
APERTURE EFFICIENCY - dB (η)
K° HPBW x (D/λ) DEGREES
FIRST SIDELOBE LEVEL - dB
η
FIRST SIDELOBE
K°
0
1
2
3
4
5
6
7
8
85
80
75
70
65
60
16
18
20
22
24
26
28
30
1
0.8
0.6
0.4
0.2
0
EDGE AMPLITUDE
0
3
6
10
20
∞
dB

TABLE IV

CALCULATED & MEASURED SECONDARY PATTERN CHARACTERISTICS - SUMMARY

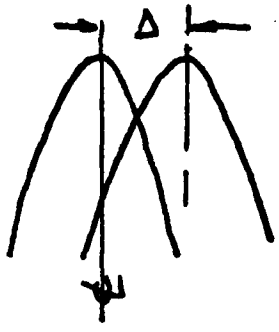
28 FOOT ANTENNA WITH ANGLE DIVERSITY FEED

Frequency MHz	PLANE - ELEVATION				PLANE - AZIMUTH			
	Vertical Polarization		Horizontal Polarization		Vertical Polarization		Horizontal Polarization	
	HPBW (')	First Sidelobe dB	HPBW (')	First Sidelobe dB	HPBW (')	First Sidelobe dB	HPBW (')	First Sidelobe dB
Calculated								
4400	32'	23.8	30'	21.8	32'	24.4	31'	23.1
4700	30'	23.8	30'	23.5	32'	25.4	34'	26.9
5000	28'	23.8	29'	24.6	28'	23.8	33'	28.1
Measured								
4700 Right Antenna	32'	21.0	33'	22.0	29'	22.0	27'	22.0
4700 Left Antenna	30'	23.0	30'	25.0	30'	22.0	28'	23.0

FIGURE 65

TABLE V

RELATIVE BEAM POSITIONS



CALCULATED

From Silver, p. 488, $\Delta = 60\ (BDF)\ TAN^{-1} \left(\frac{2Y}{f} \right)$ minutes arc where BDF $\simeq$ 0.88 for f/D = 0.42.

From phase center measurements, Y = 0.92 (horizontal polarization), Y = 1.03 (vertical polarization).

Horizontal Polarization	$\Delta = 60\ (0.88)\ TAN^{-1}\ (1.84/142.2) = 39'$
Vertical Polarization	$\Delta = 60\ (0.88)\ TAN^{-1}\ (2.06/142.2) = 44'$

MEASURED

From measured secondary patterns, bisecting half-power points

	RIGHT ANTENNA	LEFT ANTENNA	AVERAGE
Horizontal Polarization	39'	33'	36'
Vertical Polarization	44'	41'	42.5'

FIGURE 66

TABLE VI

CROSSOVER LEVELS (dB)

Measured At 4700 MHz

POLARIZATION	RIGHT ANTENNA	LEFT ANTENNA	CALCULATED
Horizontal	5.5	5.5	5.7
Vertical	3.8	3.0	4.0

RELATIVE GAINS (dB), COMPARED TO ORIGINAL FEED

POLARIZATION	RIGHT ANTENNA		LEFT ANTENNA	
	Elevated Beam	Lower Beam	Elevated Beam	Lower Beam
Horizontal	+0.3	+0.1	0	-0.1
Vertical	+0.1	-0.4	-0.4	-0.8

Note: Estimated measurement accuracy $\pm$ 0.5 dB

SETTING ANGLES USING TRANSITS
ON ANTENNAS SIGHTING TARGET ON WHITE PEDESTAL

	RIGHT ANTENNA	LEFT ANTENNA
ELEVATION	6° 11'	5° 55'
AZIMUTH	0° 00'	0° 07' CCW

FIGURE 67

NOTE:
1. DIP BRAZE ASSY PER RF SYSTEMS SPEC 812779.
2. HEAT TREAT TO T-4 CONDITION.
3. IRRIDITE AFTER ASSEMBLY.

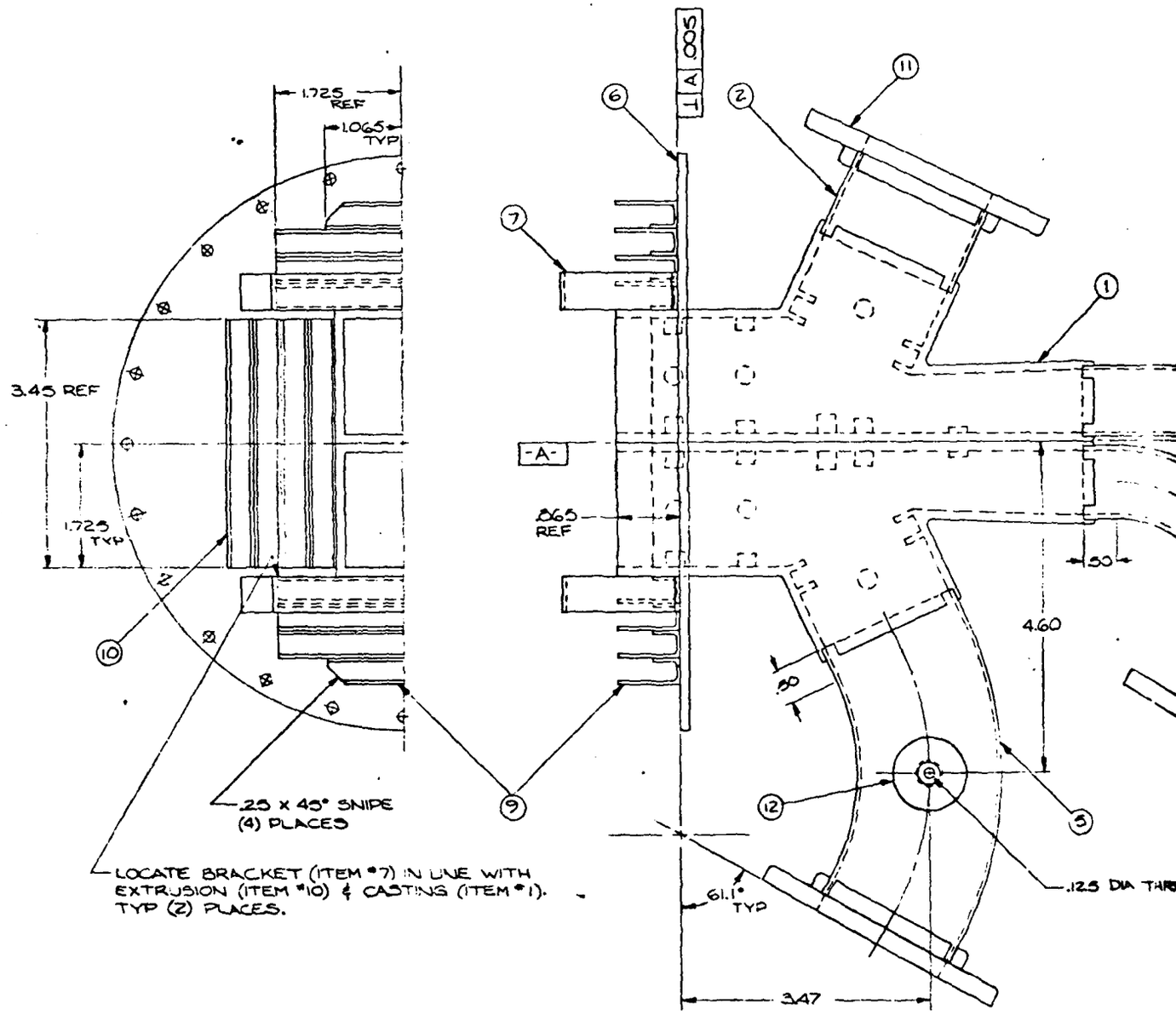
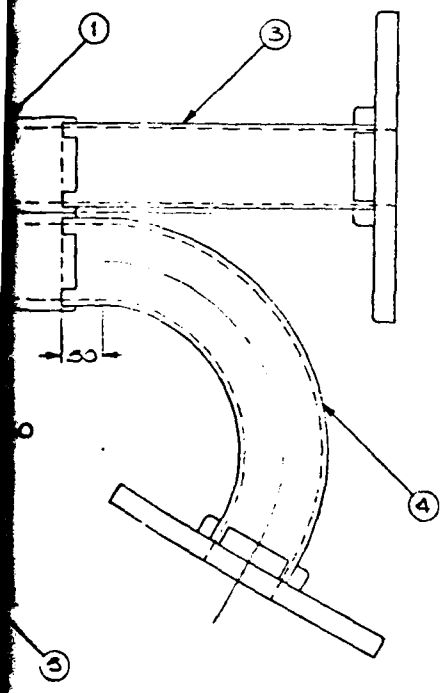


FIGURE 68

REVISIONS				
SYM	BCN	DESCRIPTION	DATE	APPROVAL
A		ADDED LOCATING DIMENSIONS FOR BOSS P/N [illegible]		



THIS PAGE IS BEST QUALITY PRACTICABLE
FROM COPY FURNISHED TO DDC

ITEM	QTY REQ'D	SIZE	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	NOTES
1	12	B	823269	BOSS			
4	11	A	187.310-1	FLANGE COVER	FORMCRAFT		
					843253		REV A
14	10	B	823228	EXTRUSION (3.45 LG)		TRIM #2119	
2	9	B	823228	EXTRUSION (2.13 LG)		TRIM #2119	
2	7	B	823259	BRACKET			
1	6	C	833258	RADOME MOUNTING R.			
1	5	C	833257	WAVEGUIDE BEND H-PLANE			
1	4	C	833256	WAVEGUIDE BEND E-PLANE			
1	3	B	823255-G2	WAVEGUIDE SECTION STRT			
1	2	B	823255-G1	WAVEGUIDE SECTION STRAIGHT			
2	1	C	833254	CASTING-MODIFIED			
X		D	843253	ANGLE DIVERSITY FEED			

LIST OF MATERIAL

QTY REQ'D G1	QTY REQ'D G2	QTY REQ'D G3	QTY REQ'D G4	ITEM	SIZE	PART NUMBER	DESCRIPTION	MATERIAL	SPECIFICATION	NOTES
G1	843252 G1	50° 692		1		1				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE
X = ± .1 XXX = ± .03
XX = ± .06 ANGLES = ± 1/2°
COMMERCIAL PURCHASED TOLERANCES SHALL APPLY TO TUBING, BAR, PLATE, ETC.
ALL THREADS TO BE CLASS 3A OR 3B. PLATED PARTS ADJUST BY GAGING AND ASSY SPECIFIED TOLERANCES AFTER PLATING.

REMOVE BURRS & BREAK SHARP CORNERS

CAUTION

DRAFTSMAN: PETER ADDUCI DATE: 3/17/77
CHECKED:
ENG APPROVAL: 3/17/77
ENG APPROVAL:

R F SYSTEMS, INC.
COHASSET MASS

ANGLE DIVERSITY FEED
BRAZING ASSEMBLY

CODE IDENT NO: 24854 SIZE: D 843253
SCALE: 1/1 WEIGHT: EST. ACT. SHEET 1 OF 1

TABLE VII

CALCULATION OF MINIMUM REFLECTOR DIAMETER FOR CRITERIA OF 20 dB SIDELOBES

FREQUENCY RANGE MHZ	FEED DIAMETER, INCHES	TRANS. LINE SIZE, INCHES	SPAR SIZE, INCHES	MINIMUM DIAMETER OF REFLECTOR, FEET	EST. CW POWER HANDLING CAPACITY
755-985	48	10 (W.G.)	4	57	30
755-985	48	4 (COAX)	4	45	10
1700-2400	24	2.5 (W.G.)	3	27.5	20
4400-5000	8	3 (W.G.)	2	18.6	10
7500-8500	5	2 (W.G.)	2	15.6	3

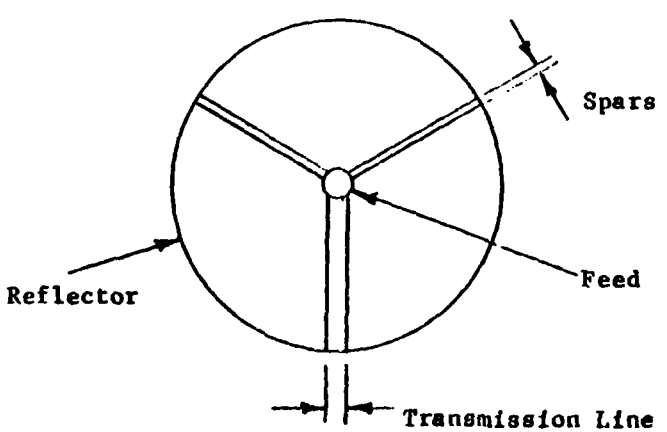


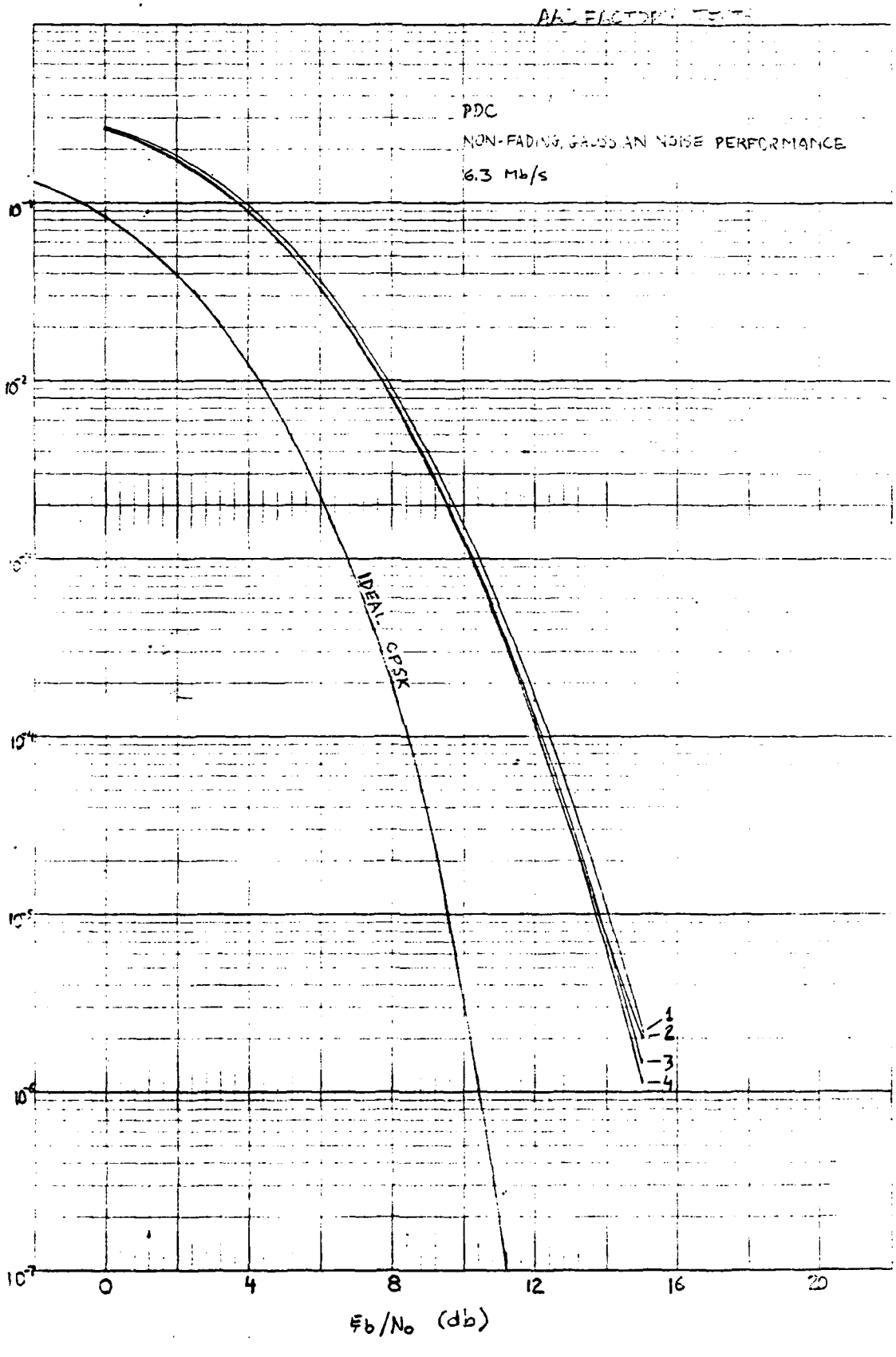
TABLE VIII

SECONDARY PATTERN CHARACTERISTICS OF TROPO ANTENNAS WITH ANGLE DIVERSITY FEEDS

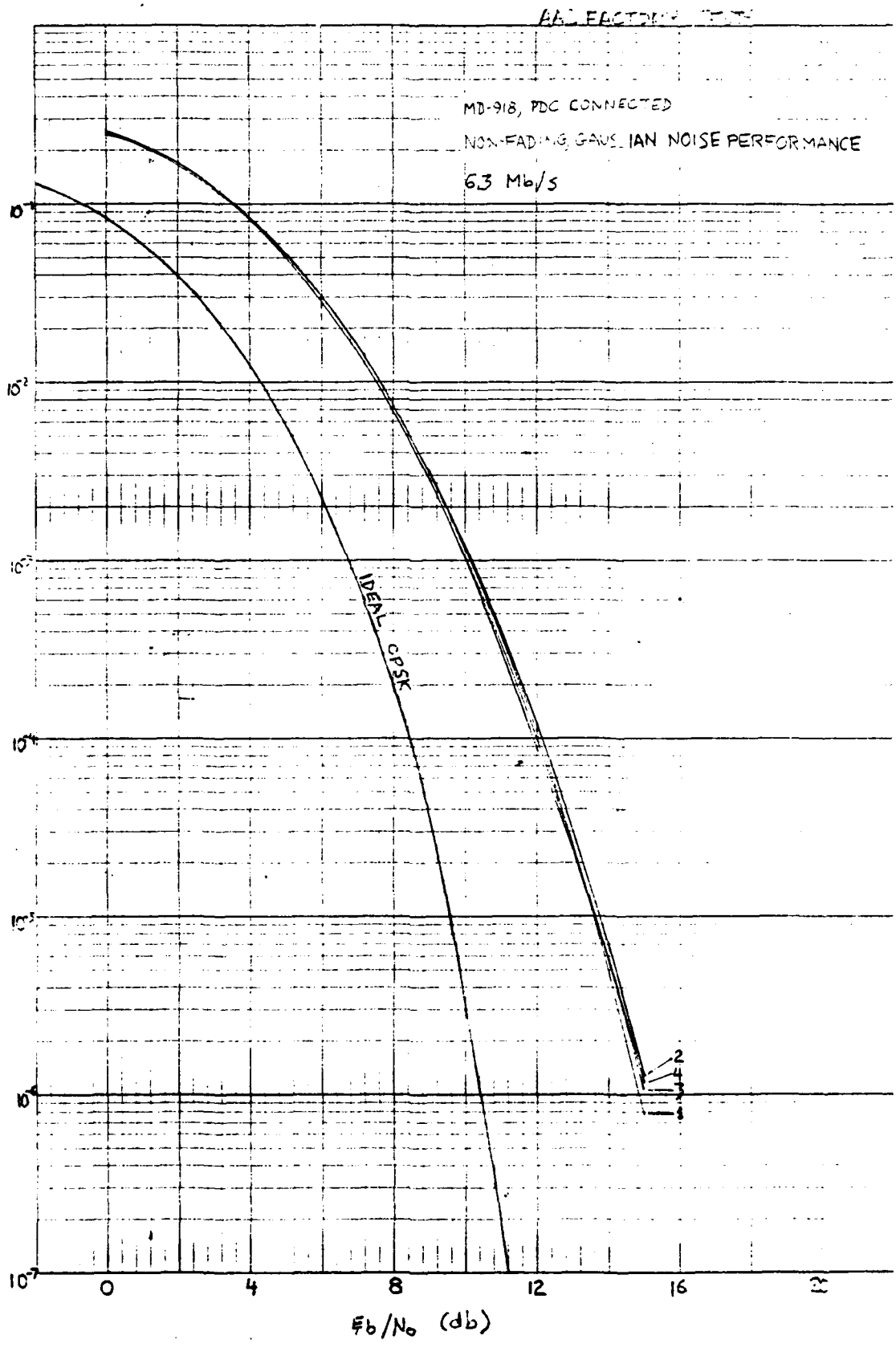
FREQUENCY BAND MHZ	REFLECTOR DIAMETER FEET	PEAK GAIN AT MIDBAND dBi	HALF-POWER BEAMWIDTH DEGREES AT MIDBAND	BEAMSHIFT (LOWER TO UPPER) DEGREES AT MIDBAND		SIDELOBE LEVEL, dB	RANGE OF FOCAL LENGTHS, INCHES
				Vert.	Horiz.		
755 - 985	60	41.6	1.30	1.79	1.51	20.5	288 - 324
755 - 985	45	39.1	1.75	2.38	2.02	20.0	216 - 243
1700-2400	30	42.9	1.15	1.52	1.28	20.0	144 - 162
4400-5000	28	49.6	0.54	0.71	0.60	21.0	134 - 151
7500-8500	20	51.2	0.44	0.58	0.49	21.0	96 - 108

APPENDIX B

B.E.R. FACTORY TESTS

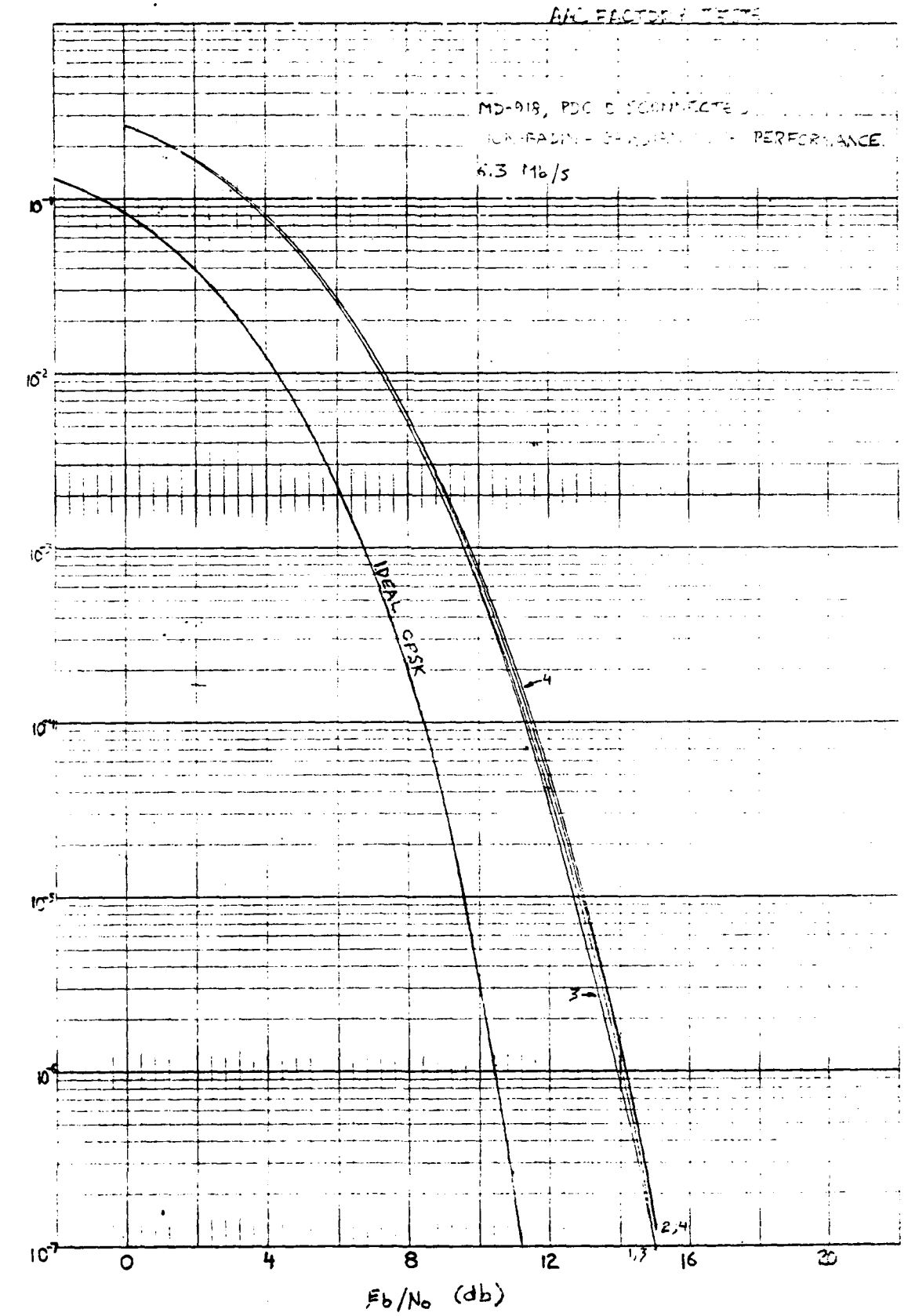


46 6460
K+E SEMI LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO.



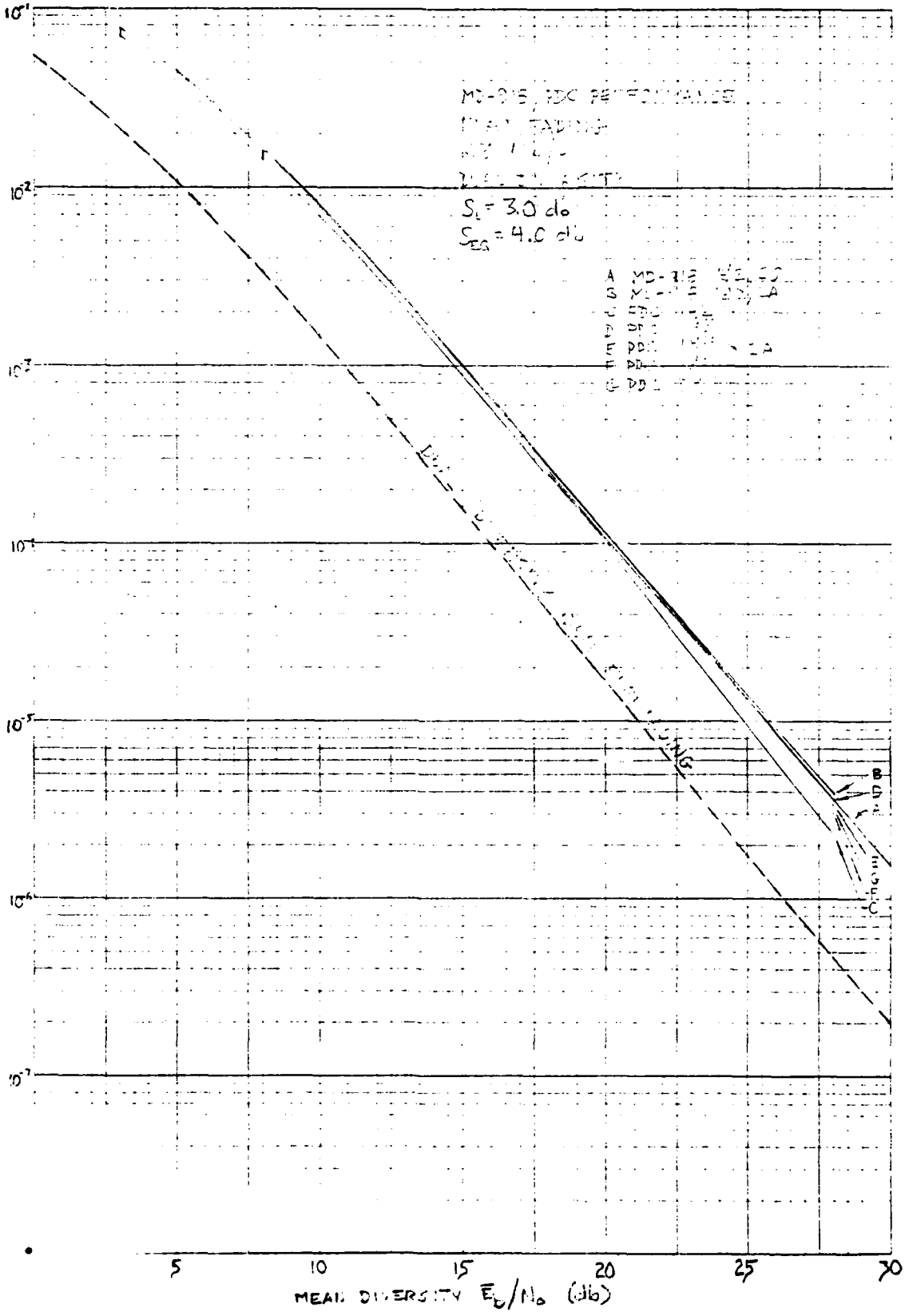
46 6460

K&E SEMI-LOGARITHMIC 7 CYCLES X 10 DIVISIONS
KEUFFEL & ESSER CO



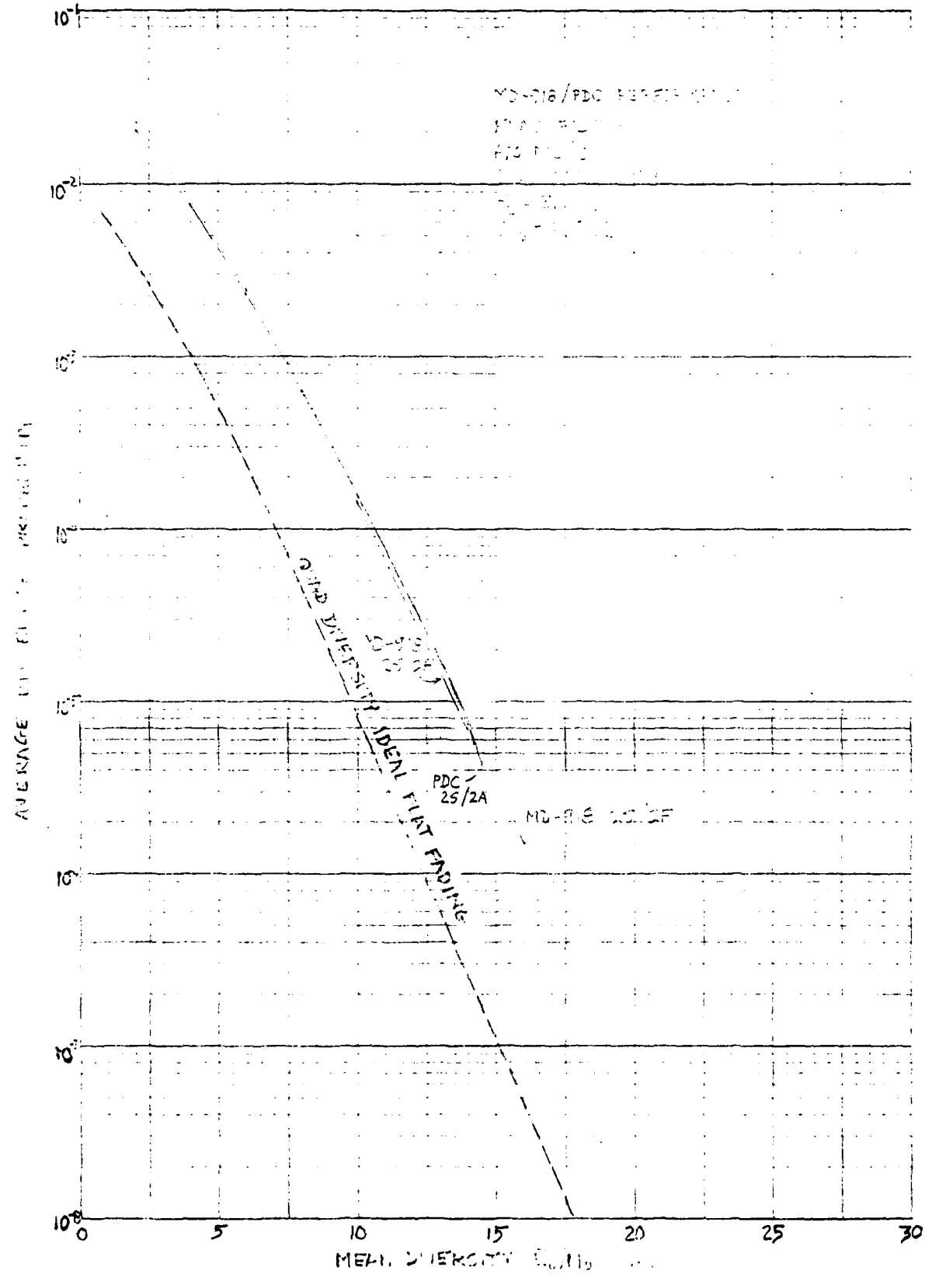
46 6460

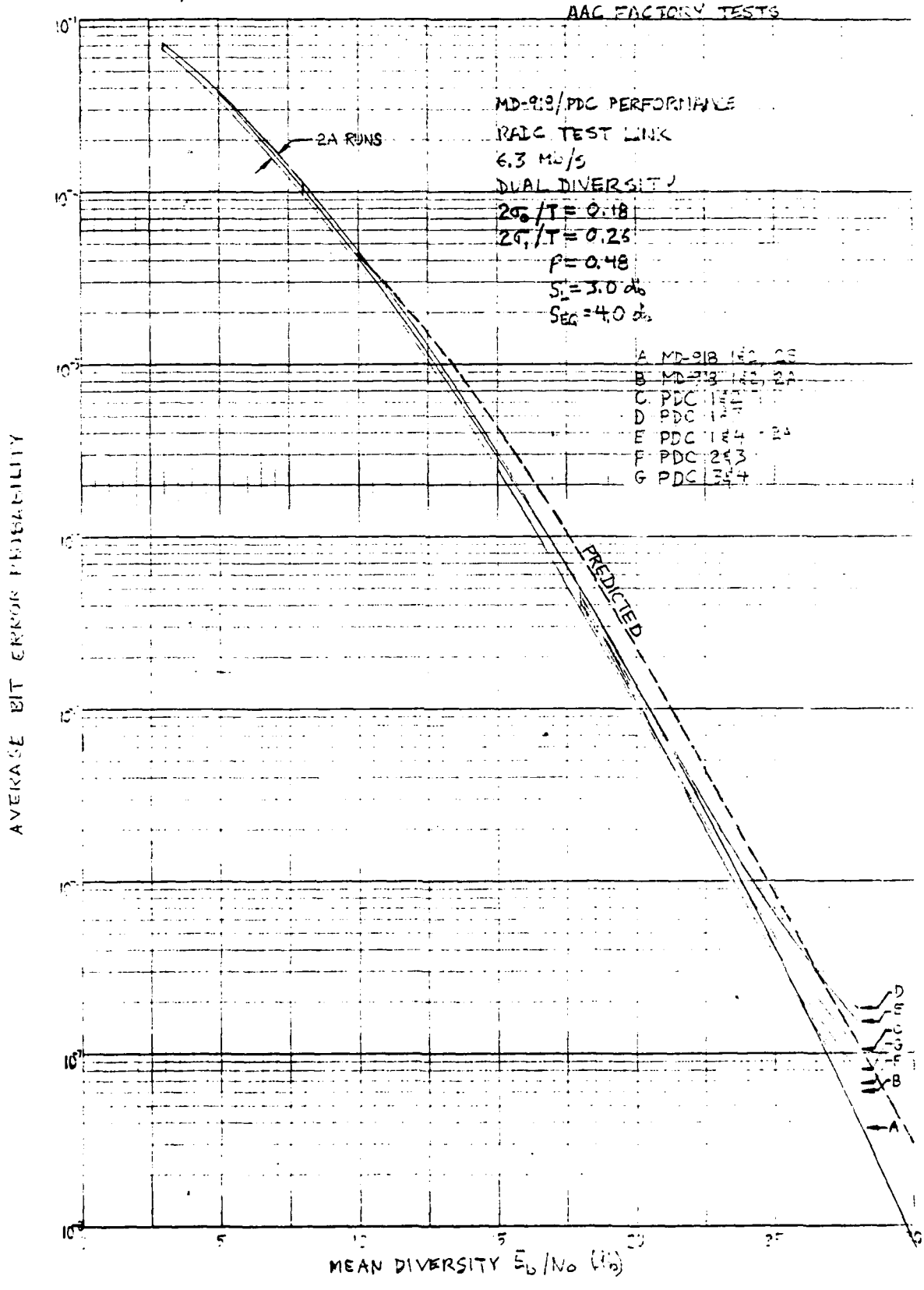
K&E SEMI-LOGARITHMIC 7 CYCLES X 1 DIVISIONS
KEUFFEL & ESSER CO


$S_L = 3.0$ db
$S_{EA} = 4.0$ db
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
5
10
15
20
25
30
MEAN DIVERSITY E_b/N_o (db)

46 6460

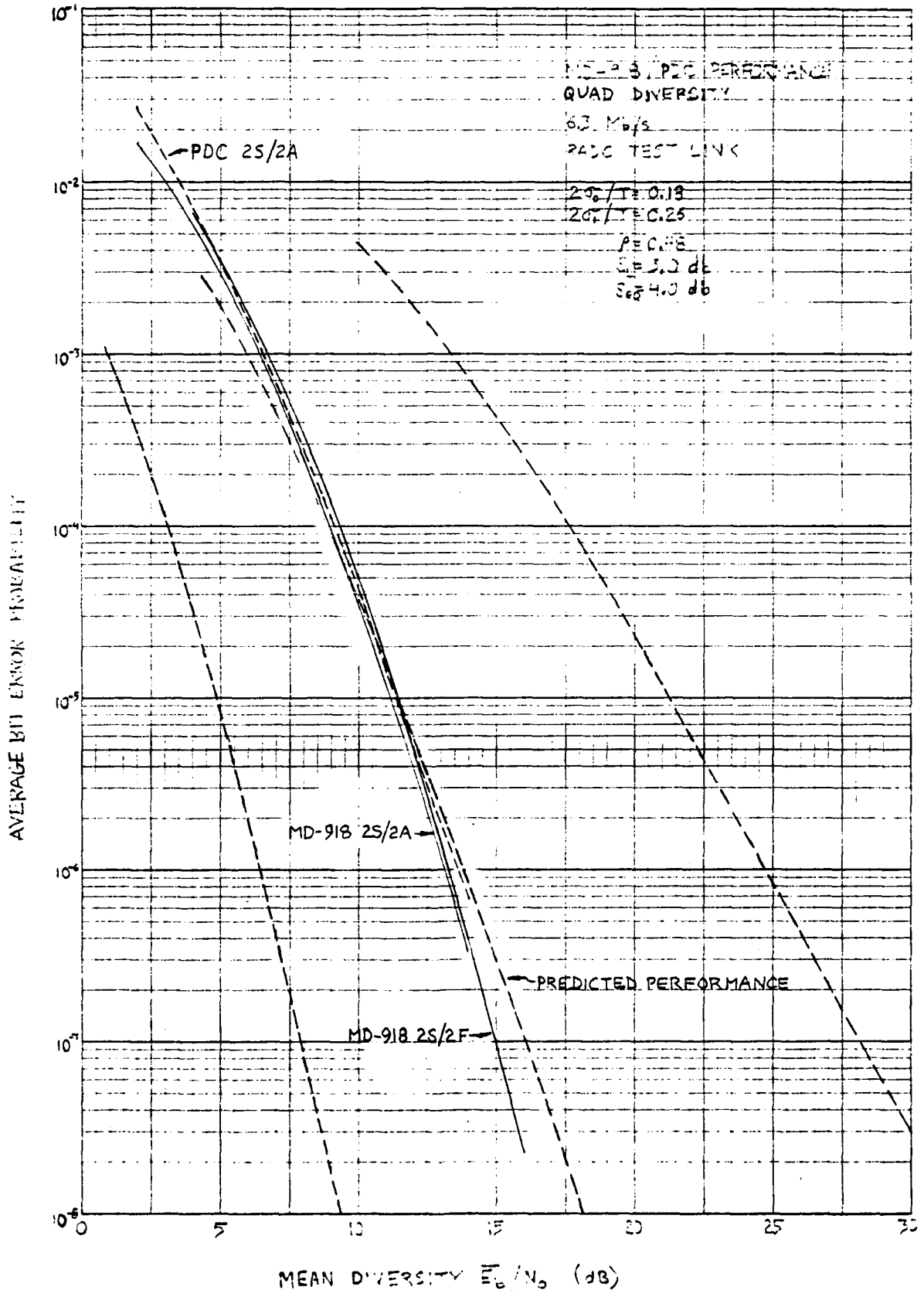
1-2


IDEAL FLAT FADING
PDC 25/2A
0
5
10
15
20
25
30

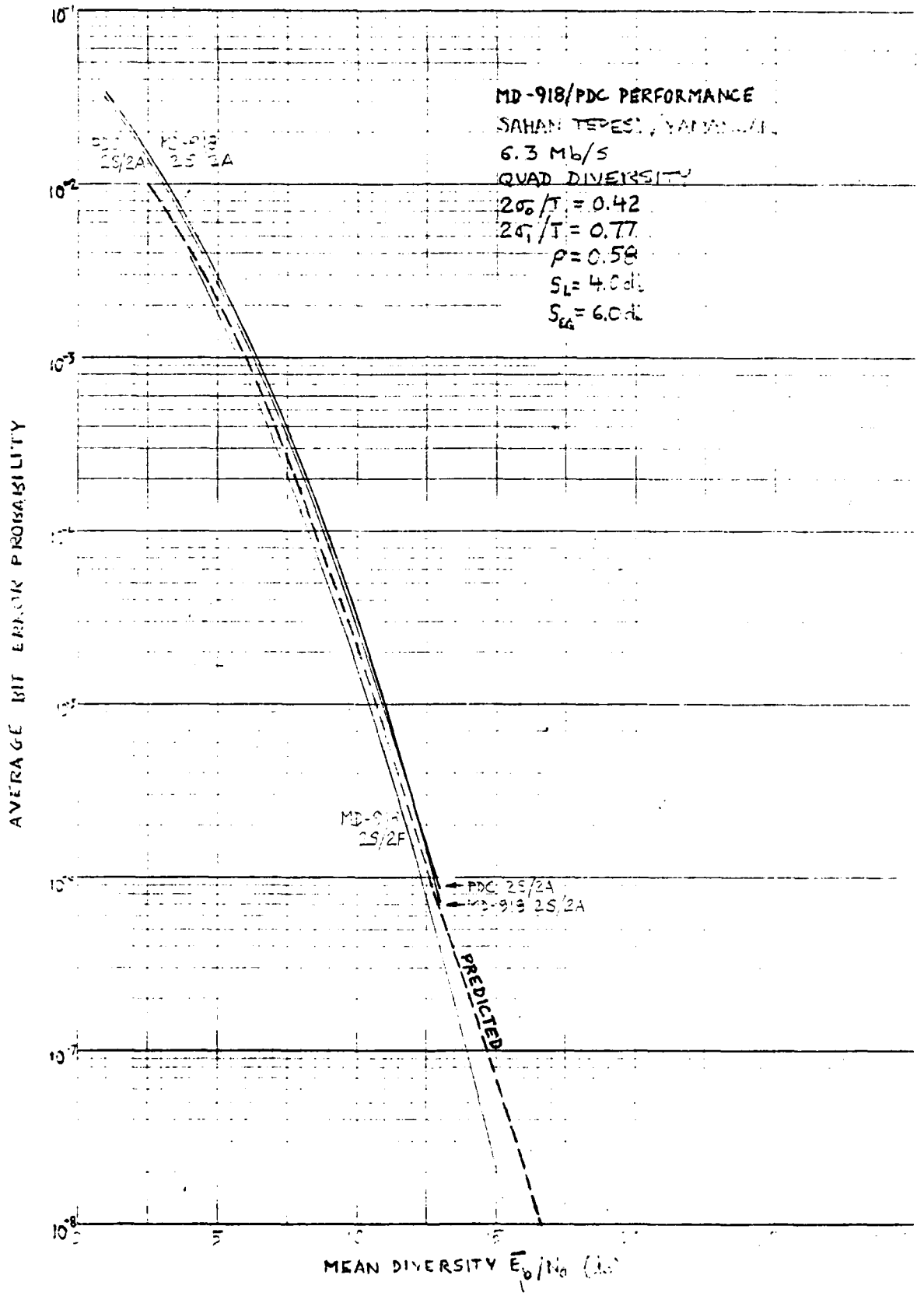


46 6460

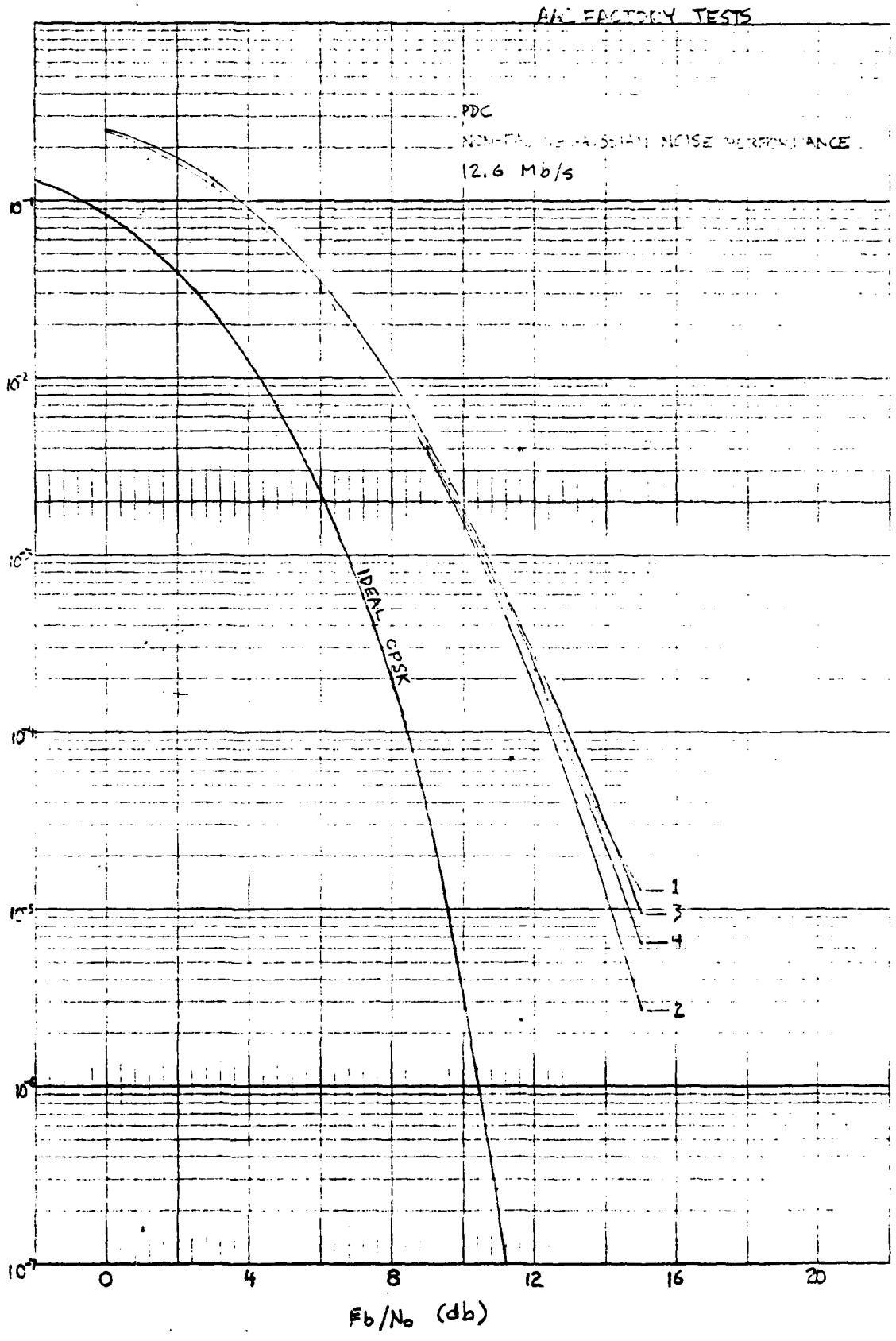
K+E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO.



46 6460
K&E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.

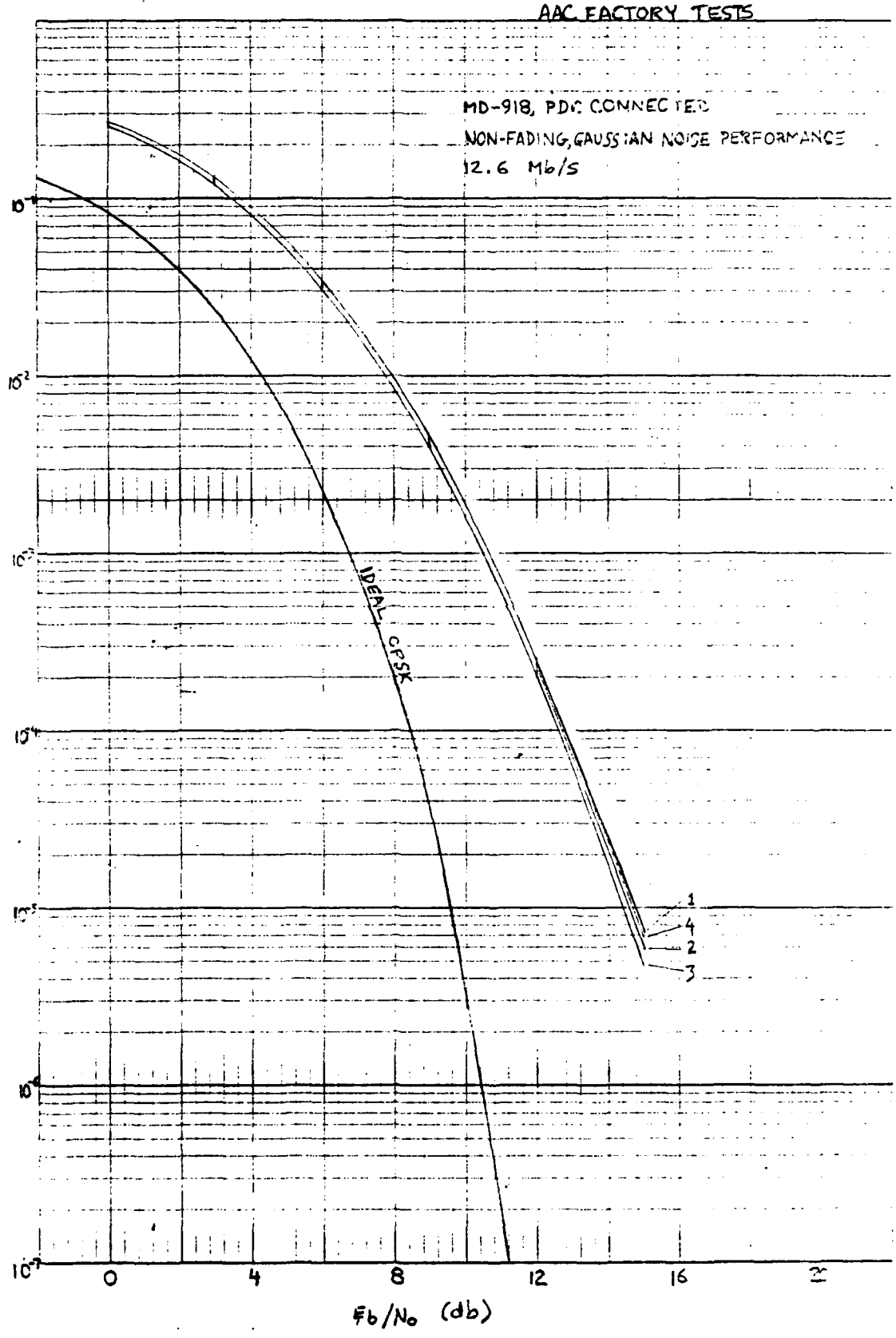

MD-918/PDC PERFORMANCE
SAHAN TEPESI, YAMANLAR
6.3 Mb/s
QUAD DIVERSITY
$2\sigma_0/T = 0.42$
$2\sigma_1/T = 0.77$
$\rho = 0.58$
$S_L = 4.0$ dB
$S_{EQ} = 6.0$ dB
PDC 2S/2A
MD-918 2S/2A
MD-918 2S/2F
PREDICTED
AVERAGE BIT ERROR PROBABILITY
MEAN DIVERSITY $\bar{E}_b/N_0$ (dB)

46 6160



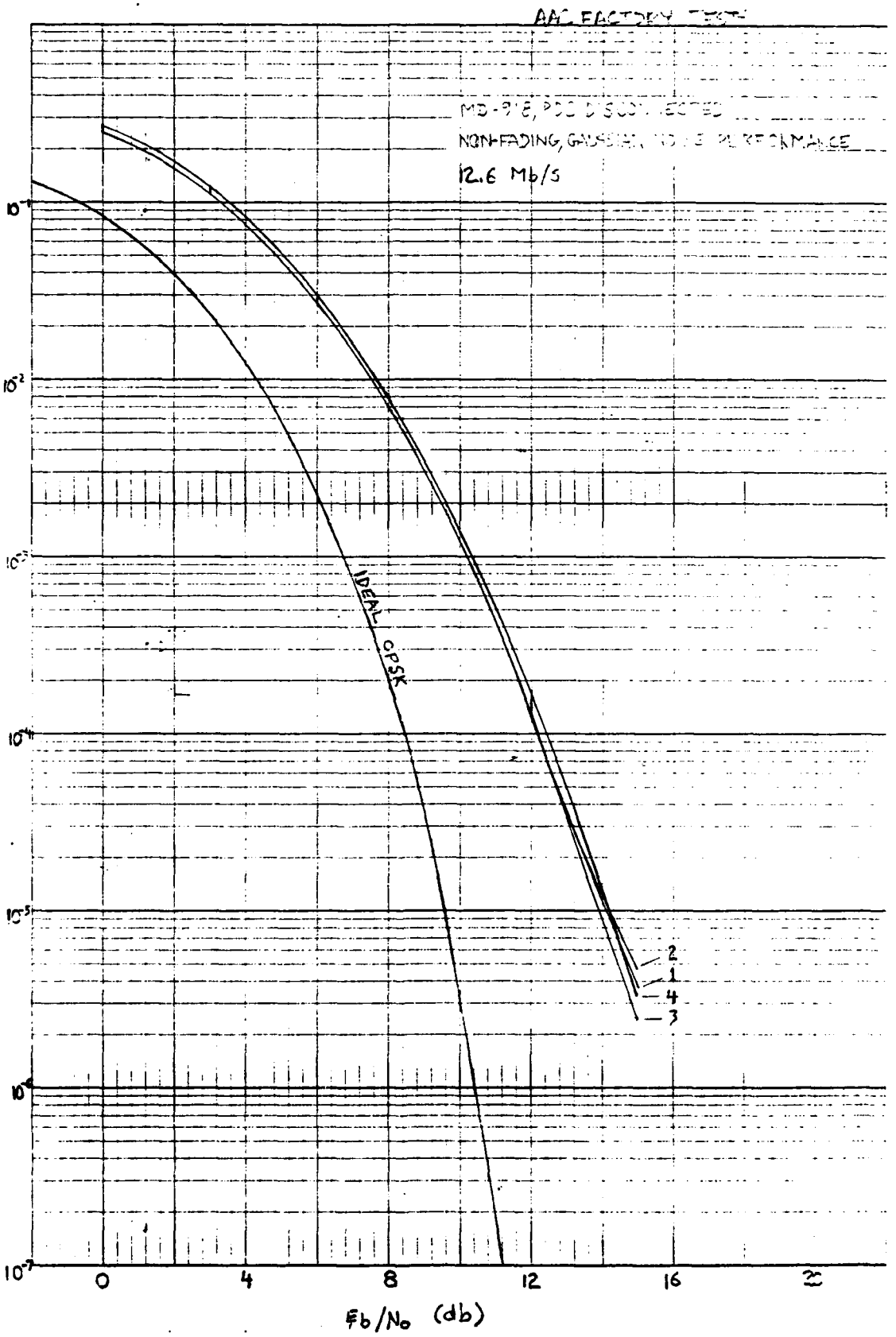
46 6460
K+E SEMI-LOGARITHMIC 7 CYCLES X 10 DIVISIONS
KEUFFEL & ESSER CO.

AAC FACTORY TESTS



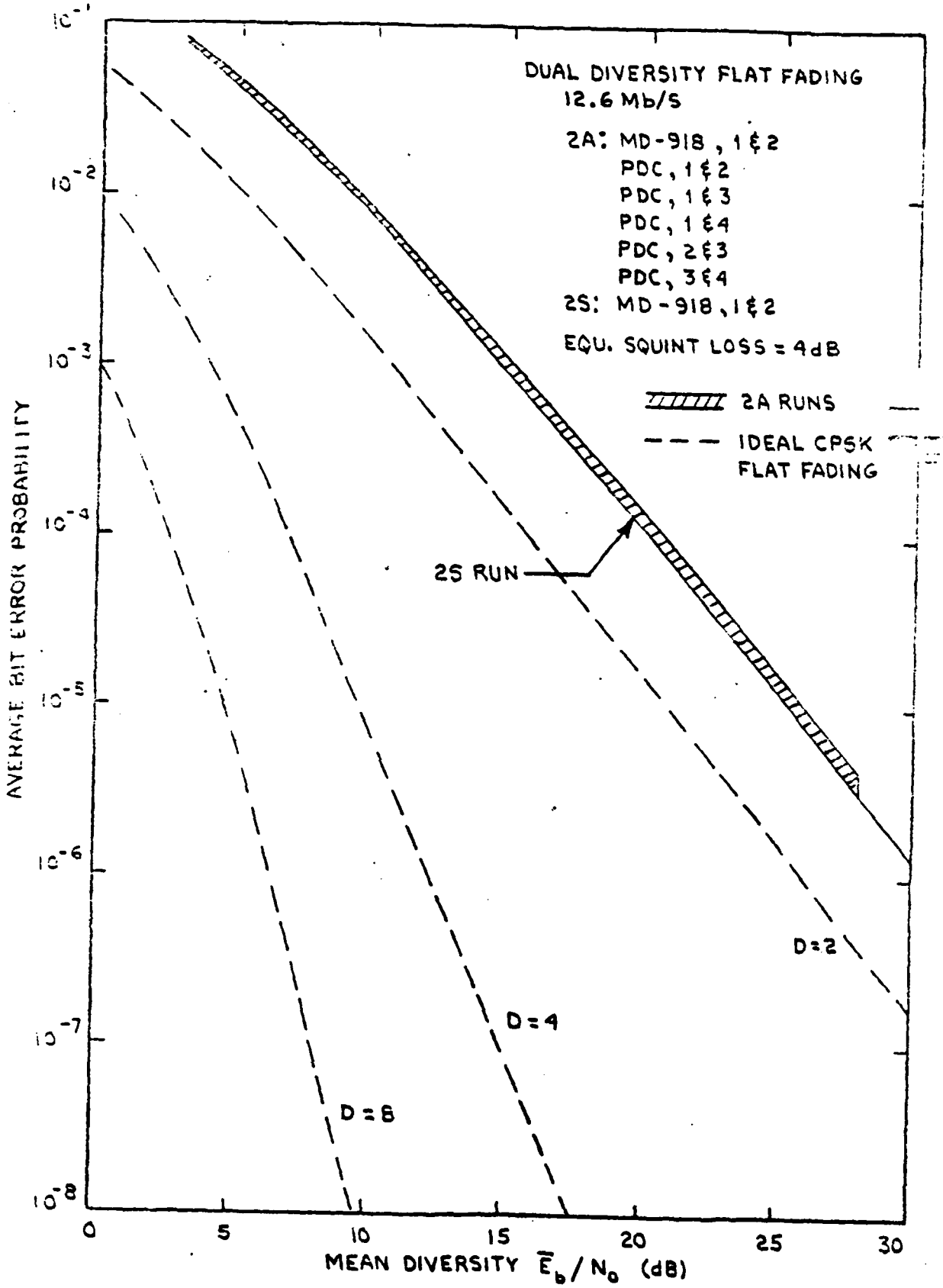
46 6460

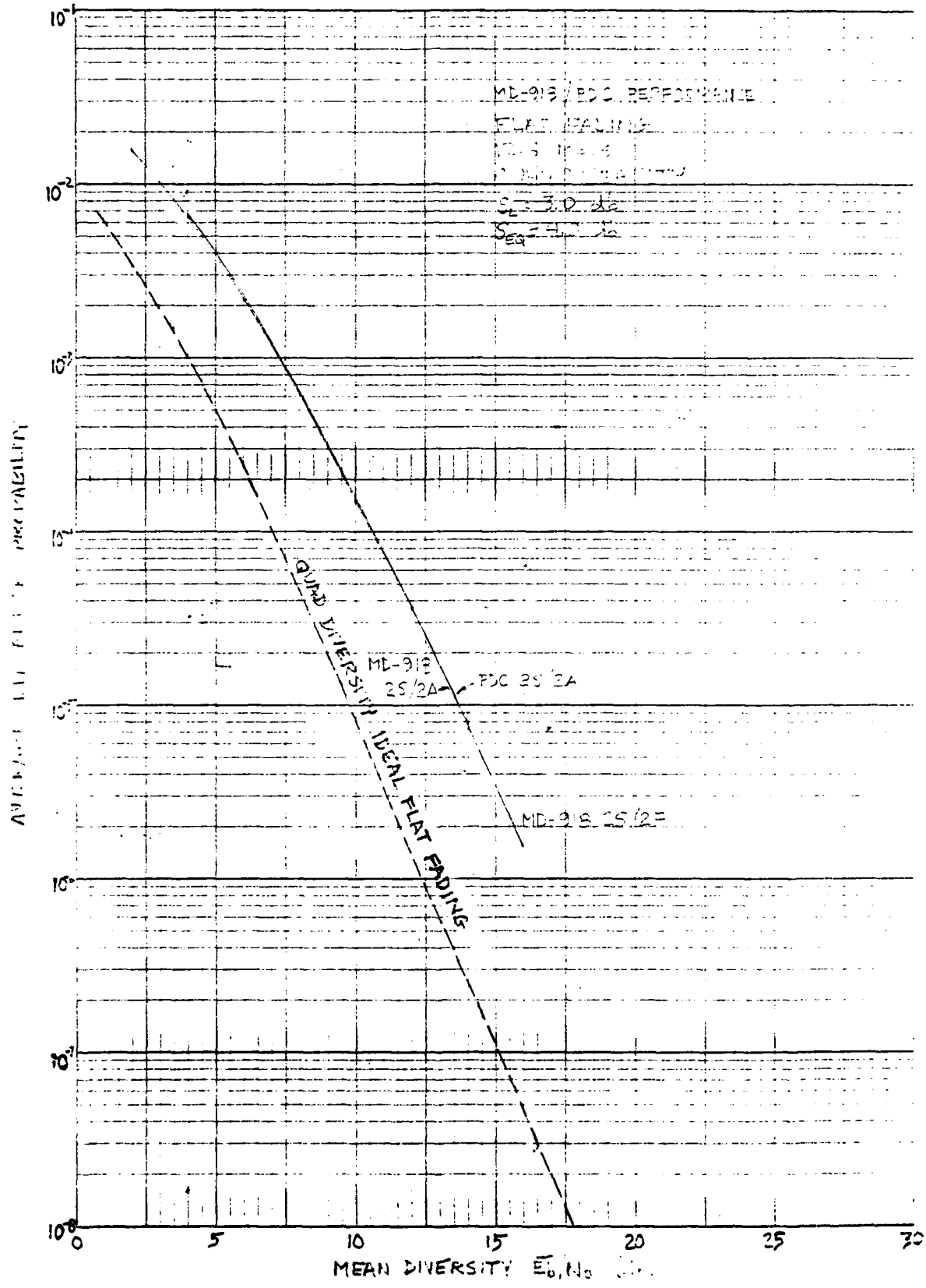
K&E SEMILOGARITHMIC 7 CYCLES X 10 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.



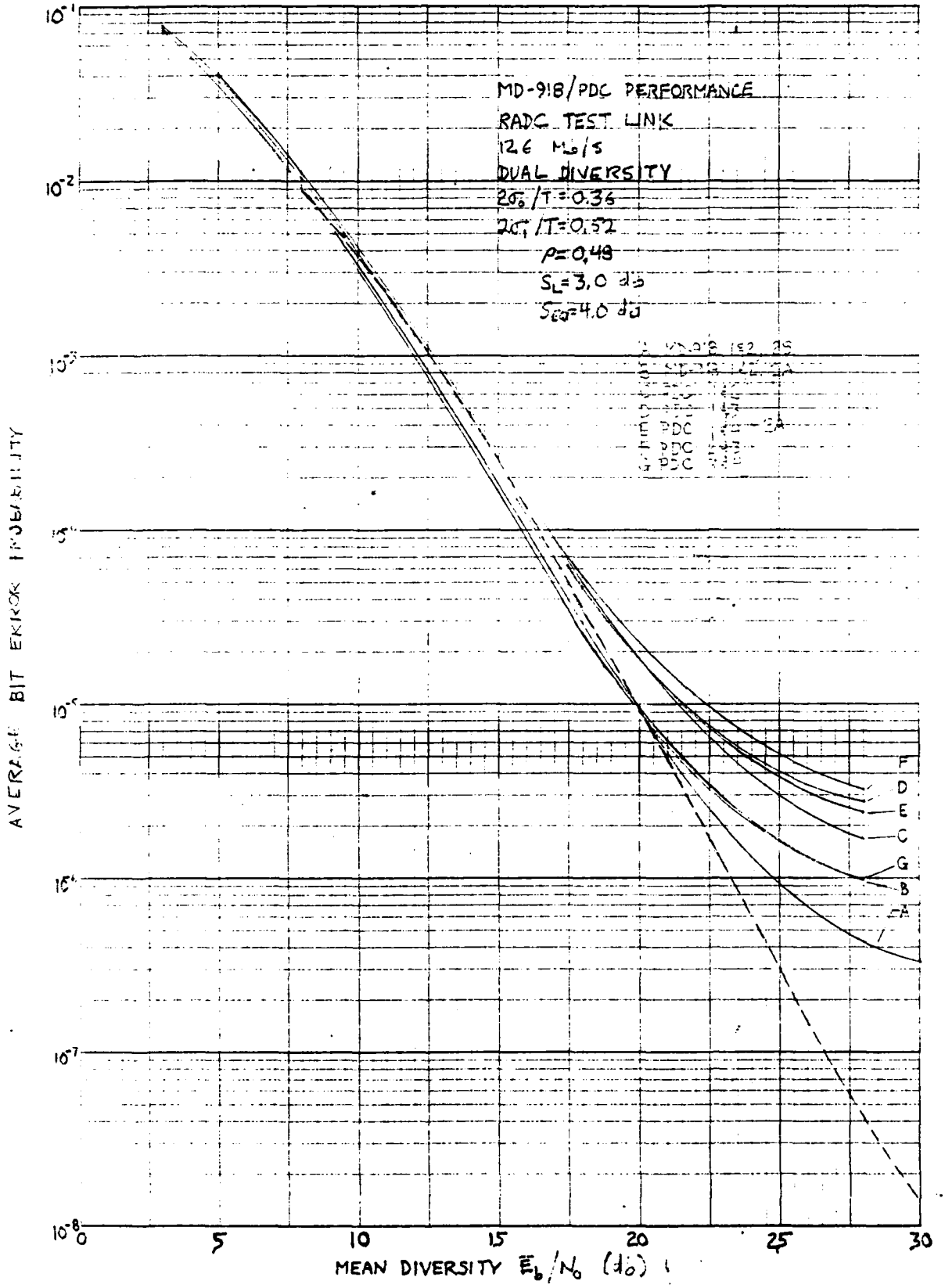
46 6460

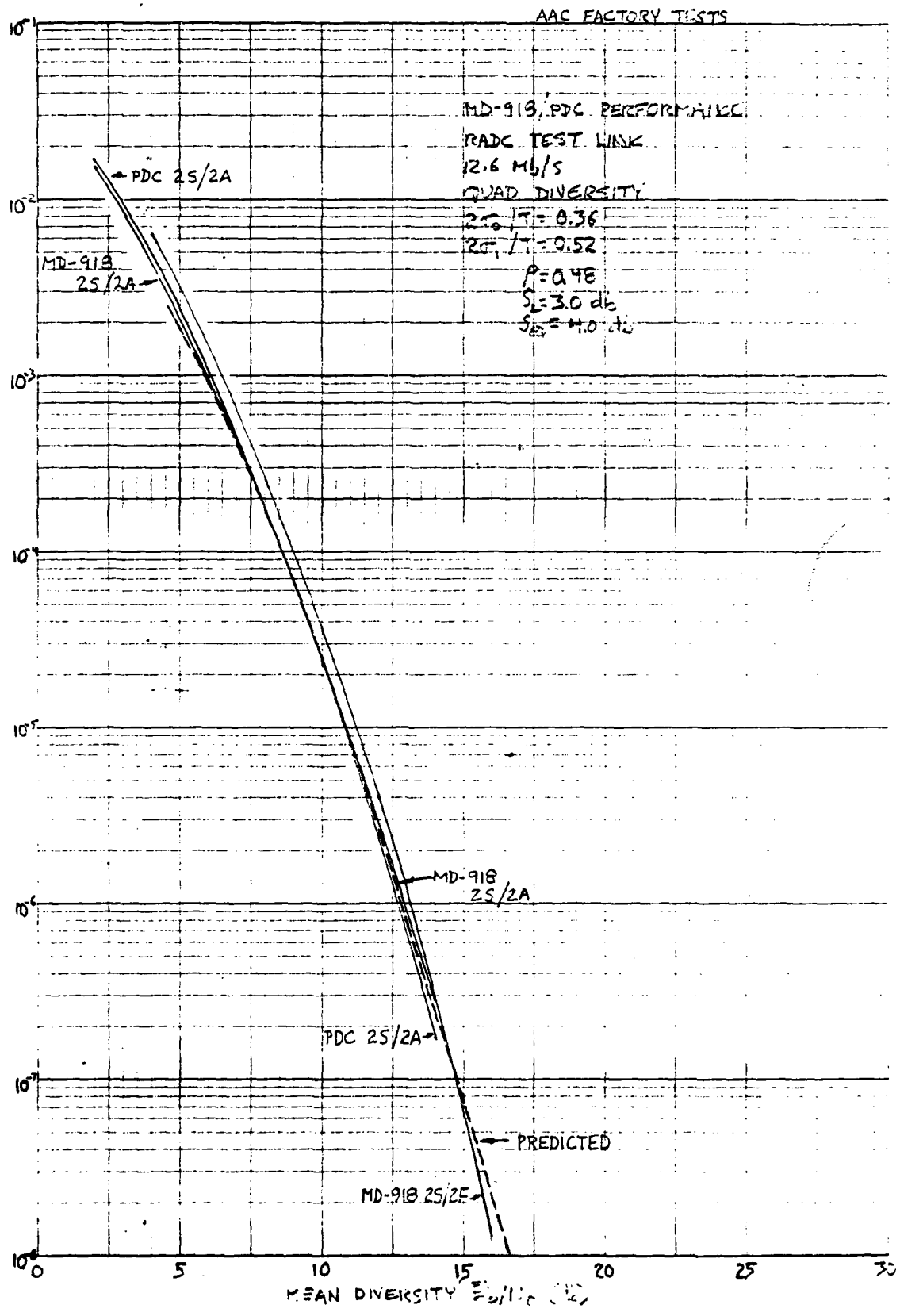
K-E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.


DUAL DIVERSITY FLAT FADING
12.6 Mb/s
2A: MD-918, 1&2
PDC, 1&2
PDC, 1&3
PDC, 1&4
PDC, 2&3
PDC, 3&4
2S: MD-918, 1&2
EQU. SQUINT LOSS = 4dB
2A RUNS
IDEAL CPSK FLAT FADING
2S RUN
D=2
D=4
D=8
AVERAGE BIT ERROR PROBABILITY
MEAN DIVERSITY $\bar{E}_b/N_o$ (dB)
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
0
5
10
15
20
25
30



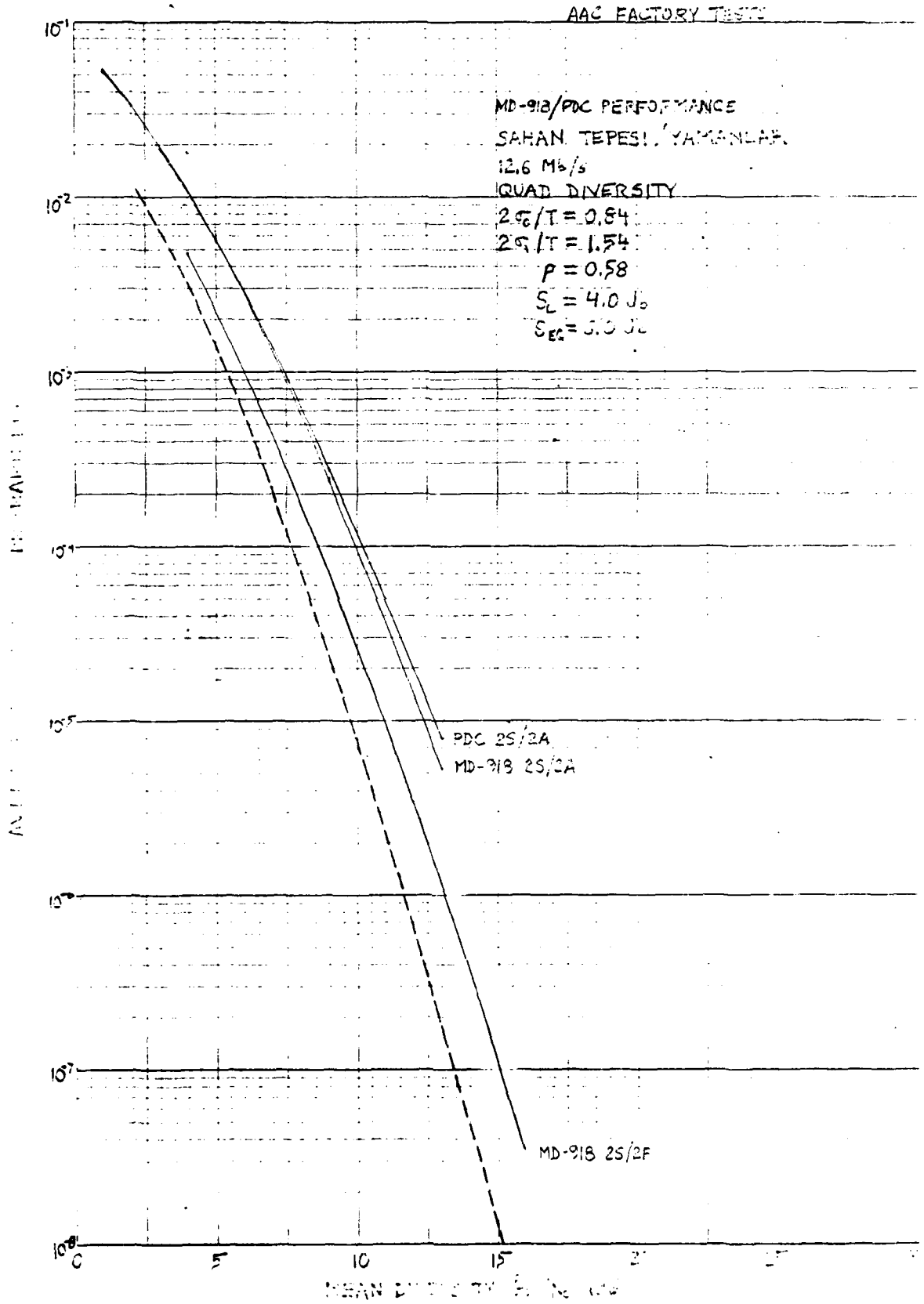
46 6460
K·E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.


MD-918/PDC PERFORMANCE
RADC TEST LINK
12.6 Mb/s
DUAL DIVERSITY
$2\sigma_0/T = 0.36$
$2\sigma_1/T = 0.52$
$\rho = 0.49$
$S_L = 3.0$ db
$S_{\epsilon_0} = 4.0$ db
F
D
E
C
G
B
A
AVERAGE BIT ERROR PROBABILITY
MEAN DIVERSITY $\bar{E}_b/N_0$ (db)
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
0
5
10
15
20
25
30



46 6460

K&E SEMI-LOGARITHMIC 7 CYCLES X 60 DIVISIONS
KEUFFEL & ESSER CO


AAC FACTORY TESTS
MD-918/PDC PERFORMANCE
SAHAN TEPESI, YAMANLAR
12.6 Mb/s
QUAD DIVERSITY
2σc/T = 0.84
2σs/T = 1.54
ρ = 0.58
SL = 4.0 Jb
SEC = 3.0 Jb
PDC 2S/2A
MD-918 2S/2A
MD-918 2S/2F
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
10⁻⁷
10⁻⁸
0
5
10
15

APPENDIX C

CORRELATION COEFFICIENT ANALYZER CALIBRATION DATA

$\alpha = 10^{(P_\alpha/20)}$

Fading = 5Hz

P_α	P_β	$P_{\alpha+\beta}$	P_{A_1}	α	β	P_{CALC}	A	B	C	D	E	ρ_{meas}	γ
$-\infty$	$-\infty$	$= \leftrightarrow =$	$=$	0		0	7.5	2.7	2.7	11	11	.06	
		Ramp until P_{REF}		1dB			9.5	3.1	3.2	14.5	15.5	-.08	
							10	3.05	3.15	14.5	14.5	0.08	
											AVG	.02	
	$-\infty$	$= \leftrightarrow =$			0	1	15	3.05	3.25	14.5	16	.96	
							15	3.05	3.20	14.5	15.5	1.00	
							16	3.15	3.35	15.5	17	.96	
											AVG	.97	
-40.1	-19.9			9.87×3^{3}	1.01×15^{1}	.10	14	3.7	3.65	20.5	19.5	.08	
-20.1			P_{REF}	$\uparrow$ 1.13			8.5	2.9	3	12.5	13.5	-.05	
							9	2.95	2.9	13.5	12.5	.1	
							10.5	3.15	3.15	15.5	AVG	.04	
											12.17		.08
-34.1	-19.9			.020		.191	10	3.05	3	14.5	13.5	.176	
							9.5	3.05	2.9	14.0	13.0	.141	
							8.5	2.85	2.85	13	12	.223	
											AVG	.113	
-30	-20.0					.302	10.5	3.3	3.05	16.5	13.5	.09	
							11.5	3.35	3.2	17	15	.149	
							10.5	3.25	3	16.5	13.5	.145	
							10.5	3.25	3.15	16	15	.05	
-28											AVG	.11	
-28	-20					.37	9.5	3.05	2.85	14.5	12.0	.18	
							8.5	2.95	2.75	13	11.5	.09	
							13	3.7	3.3	20	16	.14	
											AVG	.14	
-20	-20					.707	13.0	3.1	3.3	15	16	.53	
-20	-20						13	3.1	3.35	14.5	17.5	.47	
							14	3.3	3.45	16	17.5	.49	
											AVG	.50	

20/2

P_α	P_β	$P_{\alpha+\beta}$	P_{A_1}	α	β	ρ_{CALC}	A	B	C	D	E	ρ meters	γ
-24	-20					.53	14	3.6	3.45	19	17.5	.27	
							13.5	3.55	3.4	19	17	.24	
							14.5	3.65	3.45	19.5	17.5	.32	
												.28	
-20	-23.9					.85	15.5	3.5	3.3	18	16	.73	
							14.5	3.3	3.2	17	15.5	.69	
							15.5	3.4	3.3	18	16.5	.71	
											AVG	.71	
-40	-20					.10	7.5	2.8	2.6	12	10	.06	
							[illegible]	2.9	[illegible]	12.5	[illegible]	.06	
							8.5	[illegible]	[illegible]	12.5	13	.02	
							[illegible]	2.85	[illegible]	12	11.5	.01	
												.04	
							[illegible]	[illegible]	2.8	12.[illegible]	11.63	.04	
-4[illegible]	-20					.05	[illegible]	[illegible]	3	11.5	13	.063	
							[illegible]	3.05	[illegible]	[illegible]	12	-.045	
							[illegible]	[illegible]	[illegible]	13	[illegible]	.095	
							8.5	2.85	2.9	12.5	13	.05	
												.04	
							8.63	[illegible]	2.93	12.15	12.[illegible]	[illegible]	
-[illegible]	[illegible]					.14	8	2.8	2.7	12	11	.11	
							11.5	3.4	3.4	17	17	-.01	
							13	3.55	3.5	18.5	18	.10	
							12	3.45	3.45	17.5	17	.02	
												.05	
-32	-20					.244	13	3.6	3.45	19	17.5	.10	
							12	3.5	3.[illegible]	18	16.5	.05	
							13	3.65	3.4	19.5	17	.10	
							13	3.65	3.5	19.5	17.5	.04	
												.07	

APPENDIX D

RECEIVED SIGNAL LEVEL AND FADE RATE FIELD TEST DATA

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM: PA1	PA2	TEST LENGTH (MIN)
3NOV77	1423	-94	-94	-96	-94	--	--	--	--	63	63	20
		1.7	1.5	1.5	1.5	--	--	--	--			
3NOV77	1448	-93	-94	-97	-97	--	--	--	--	63	63	20
		1.5	1.4	1.1	1.2	--	--	--	--			
3NOV77	1513	-93	-93	-97	-96	--	--	--	--	63	63	20
		1.0	1.0	1.3	1.3	--	--	--	--			
3NOV77	1538	-93	-95	-96	-96	--	--	--	--	63	63	20
		1.0	0.8	0.9	0.9	--	--	--	--			
3NOV77	1603	-99	-100	-102	-100	--	--	--	--	63	63	20
		1.3	1.4	1.4	1.4	--	--	--	--			
4NOV77	1029	-91	-86	-93	-90	--	--	--	--	63	63	20
		1.3	1.4	1.4	1.4	--	--	--	--			
4NOV77	1138	-91	-90	-91	-89	--	--	--	--	63	63	20
		1.0	1.1	1.1	1.0	--	--	--	--			
4NOV77	1202	-92	-91	-92	-91	--	--	--	--	63	63	20
		1.1	1.1	1.0	1.0	--	--	--	--			
4NOV77	1354	-95	-95	-96	-95	--	--	--	--	63	63	20
		1.0	1.0	1.2	1.3	--	--	--	--			
5NOV77	1030	-92	-90	-93	-89	--	--	--	--	63	63	20
		0.2	0.3	0.3	0.3	--	--	--	--			
5NOV77	1053	-90	-89	-93	-89	--	--	--	--	63	63	20
		0.3	0.3	0.3	0.4	--	--	--	--			
5NOV77	1116	-90	-89	-93	-88	--	--	--	--	63	63	20
		0.3	0.4	0.4	0.4	--	--	--	--			
5NOV77	1138	-88	-87	-91	-88	--	--	--	--	63	63	20
		0.4	0.5	0.5	0.5	--	--	--	--			
5NOV77	1200	-90	-89	-94	-90	--	--	--	--	63	63	20
		0.5	0.6	0.5	0.6	--	--	--	--			
5NOV77	1503	-91	-94	-93	-94	--	--	--	--	63	63	20
		0.9	0.8	0.7	0.7	--	--	--	--			
5NOV77	1527	-94	-95	-94	-92	--	--	--	--	63	63	20
		0.7	0.6	0.9	0.7	--	--	--	--			
5NOV77	1550	-90	-92	-90	-90	--	--	--	--	63	63	20
		0.5	0.5	0.6	0.6	--	--	--	--			
6NOV77	1150	-95	-96	-99	-98	--	--	--	--	63	63	20
		0.6	0.6	0.7	0.8	--	--	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
6NOV77	1413	-94	-97	-104	-100	--	--	--	--	63	63	20
		0.7	0.7	0.8	0.8	--	--	--	--			
11NOV77	1347	-94	-97	-98	-101	--	--	--	--	63	63	20
		1.5	1.4	1.2	1.3	--	--	--	--			
12NOV77	1017	-96	-93	-99	-98	--	--	--	--	63	63	20
		0.9	1.0	0.7	1.0	--	--	--	--			
12NOV77	1038	-95	-94	-98	-97	--	--	--	--	63	63	20
		0.9	1.0	0.7	1.0	--	--	--	--			
12NOV77	1102	-97	-95	-99	-98	--	--	--	--	63	63	20
		1.0	1.1	0.8	1.0	--	--	--	--			
12NOV77	1124	-97	-96	-99	-98	--	--	--	--	63	63	20
		1.0	1.0	0.9	1.0	--	--	--	--			
12NOV77	1201	-98	-98	-104	-103	--	--	--	--	63	63	20
		0.9	1.0	0.7	1.1	--	--	--	--			
12NOV77	1223	-99	-98	-109	-103	--	--	--	--	63	63	20
		0.9	1.0	0.7	1.1	--	--	--	--			
12NOV77	1313	-100	-99	-105	-103	--	--	--	--	63	63	20
		1.1	1.2	0.9	1.2	--	--	--	--			
13NOV77	1418	-93	-92	-101	-96	--	--	--	--	63	63	20
		0.5	0.4	0.6	0.4	--	--	--	--			
13NOV77	1448	-93	-92	-100	-96	--	--	--	--	63	63	20
		0.5	0.5	0.6	0.6	--	--	--	--			
13NOV77	1553	-95	-93	-100	-96	--	--	--	--	63	63	20
		0.4	0.3	0.4	0.4	--	--	--	--			
13NOV77	1617	-97	-93	-101	-96	--	--	--	--	63	63	2
		0.3	0.2	0.3	0.3	--	--	--	--			
14DEC77	1037	-98	-97	-95	-98	-100	-98	-98	-95	63	63	2
		2.0	1.2	1.4	0.9	1.4	0.5	0.8	0.8			
14DEC77	1046	-101	-98	-97	-100	-105	-100	-100	-97	63	63	2
		2.1	1.3	1.7	1.1	1.2	0.7	0.8	0.7			
14DEC77	1053	-98	-98	-94	-97	-100	-99	-99	-95	63	63	2
		2.1	1.4	1.6	0.9	1.3	0.5	0.9	0.7			
14DEC77	1118	-98	-97	-95	-98	-100	-98	-99	-96	63	63	2
		2.0	1.0	1.5	0.8	1.3	0.5	0.9	0.7			
14DEC77	1134	-95	-96	-94	-97	-101	-98	-98	-94	63	63	2
		1.9	1.6	1.3	0.8	0.9	0.8	0.6	0.8			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
14DEC77	1143	-99	-97	-97	-99	-101	-98	-99	-95	63	63	2
		1.8	1.4	1.4	0.8	1.1	0.7	0.7	0.9			
14DEC77	1156	-100	-97	-96	-98	-102	-98	-101	-96	63	63	2
		1.9	1.4	1.5	0.8	1.2	0.8	0.9	0.9			
14DEC77	1205	-98	-96	-95	-98	-102	-98	-99	-96	63	63	2
		1.9	1.6	1.4	0.8	1.3	0.8	0.6	1.1			
19DEC77	1100	-100	-102	-98	-101	-103	-101	-102	-98	63	63	2
		1.0	1.0	0.3	0.4	0.8	0.9	0.5	0.7			
19DEC77	1112	-103	-102	-98	-101	-103	-102	-103	-99	63	63	2
		0.8	0.9	0.4	0.1	0.6	0.9	0.5	0.9			
19DEC77	1118	-102	-102	-98	-101	-104	-101	-103	-99	63	63	2
		1.0	1.3	0.5	0.4	0.8	0.8	0.5	0.8			
19DEC77	1125	-102	-102	-98	-102	-103	-101	-103	-99	63	63	2
		0.9	1.0	0.7	0.6	0.8	0.9	0.7	0.6			
19DEC77	1140	-96	-98	-96	-99	-103	-102	-103	-100	63	63	2
		0.4	0.6	0.6	0.3	0.9	0.8	0.5	0.9			
19DEC77	1147	-97	-99	-96	-99	-104	-101	-103	-99	63	63	2
		0.2	0.5	0.4	0.3	0.9	0.8	0.5	0.7			
19DEC77	1154	-97	-100	-98	-100	-103	-101	-102	-99	63	63	2
		0.4	0.7	0.4	0.2	0.6	0.8	0.6	0.7			
19DEC77	1159	-97	-100	-98	-100	-104	-102	-103	-99	63	63	2
		0.3	0.6	0.3	0.2	0.8	0.6	0.5	0.7			
19DEC77	1300	--	-96	--	-95	--	-99	--	-95	63	63	2
		--	0.9	--	0.6	--	0.5	--	0.7			
19DEC77	1320	-94	-97	-93	-96	-99	-101	-99	-99	63	63	2
		0.7	0.7	0.6	0.5	0.8	0.6	0.6	0.4			
19DEC77	1327	-95	-99	-96	-99	-102	-102	-100	-101	63	63	2
		0.7	0.5	0.9	0.5	1.0	0.5	0.7	0.6			
19DEC77	1334	-95	-98	-94	-97	-103	-103	-100	-99	63	63	2
		0.5	0.6	0.9	0.5	0.8	0.5	0.6	0.4			
19DEC77	1340	-95	-99	-93	-98	-103	-103	-101	-101	63	63	2
		0.6	0.5	0.6	0.4	0.9	0.6	0.8	0.8			
19DEC77	1355	-97	-101	-96	-100	-98	-100	-99	-99	63	63	2
		0.9	0.9	0.8	0.4	1.0	0.6	0.9	0.6			
19DEC77	1403	-97	-101	-95	-98	-95	-97	-96	-98	63	63	2
		1.1	0.7	0.7	0.4	1.0	0.6	0.8	0.6			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
19DEC77	1408	-95	-98	-94	-97	-94	-96	-95	-96	63	63	2
		0.7	0.6	0.7	0.4	0.6	0.8	0.8	0.7			
19DEC77	1416	-94	-98	-92	-95	-94	-93	-95	-94	63	63	2
		0.8	0.7	0.7	0.3	0.6	0.5	0.7	0.5			
20DEC77	904	--	-86	-83	-86	-93	-91	-90	-88	63	63	2
		--	1.5	1.0	0.4	0.6	0.8	0.7	0.9			
20DEC77	914	--	-88	-85	-87	-93	-92	-90	-88	63	63	2
		--	1.4	1.1	0.5	0.8	0.8	0.6	0.8			
20DEC77	1117	-87	-91	-85	-89	-97	-96	-96	-93	63	63	2
		1.2	1.3	1.3	1.3	0.8	0.8	0.7	0.7			
20DEC77	1123	-86	-90	-84	-88	-97	-96	-95	-93	63	63	2
		1.6	1.6	1.3	0.8	0.7	0.9	0.6	0.9			
20DEC77	1129	-84	-89	-81	-88	-97	-96	-92	-91	63	63	2
		1.4	1.5	1.2	1.1	0.8	0.9	0.6	0.8			
20DEC77	1141	-85	-91	-83	-89	-96	-93	-91	-90	63	63	2
		1.4	1.9	1.0	1.3	0.7	1.0	0.7	1.0			
20DEC77	1152	-85	-93	-82	-91	-93	-96	-90	-89	63	63	2
		1.6	1.2	1.4	1.3	1.0	0.7	1.0	0.6			
20DEC77	1158	-85	-93	-83	-92	-93	-93	-90	-92	63	63	2
		1.7	1.5	1.4	1.2	1.1	0.9	1.0	0.9			
20DEC77	1205	-85	-93	-83	-92	-91	-94	-89	-90	63	63	2
		1.9	1.9	1.5	1.4	1.1	0.5	0.9	0.6			
20DEC77	1213	-86	-94	-85	-93	-91	-93	-89	-90	63	63	2
		1.8	1.5	1.4	1.5	1.0	0.6	0.8	1.0			
22DEC77	935	-96	-99	-97	-100	-95	-94	-94	-92	63	63	2
		0.6	0.8	0.5	0.7	0.5	0.5	0.3	0.5			
22DEC77	942	-96	-98	-96	-98	-94	-93	-95	-91	63	63	2
		0.6	0.8	0.6	0.6	0.4	0.5	0.4	0.6			
22DEC77	953	-95	-97	-96	-97	-95	-93	-95	-93	63	63	2
		0.5	0.6	0.7	0.6	0.5	0.5	0.5	0.5			
22DEC77	1000	-94	-96	-95	-96	-95	-94	-95	-93	63	63	2
		0.6	0.6	0.5	0.6	0.4	0.5	0.5	0.5			
22DEC77	1028	-96	-100	-97	-102	-97	-99	-96	-96	63	63	2
		0.5	0.3	0.3	0.3	0.6	0.3	0.5	0.4			
22DEC77	1034	-97	-103	-98	-102	-99	-100	-96	-98	63	63	2
		0.4	0.3	0.4	0.2	0.5	0.3	0.3	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE. FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
22DEC77	1040	-99	-103	-98	-104	-100	-103	-99	-99	63	63	2
		0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2			
22DEC77	1046	-98	-103	-98	-101	-100	-103	-99	-99	63	63	4
		0.4	0.5	0.3	0.2	0.4	0.3	0.3	0.2			
22DEC77	1115	-97	-100	-95	-99	--	--	--	--	63	63	4
		0.4	0.4	0.3	0.4	--	--	--	--			
22DEC77	1120	-98	-101	-96	-99	--	--	--	--	63	63	20
		0.4	0.3	0.4	0.4	--	--	--	--			
22DEC77	1158	-99	-102	-98	-103	-103	-104	-100	-100	63	63	20
		0.4	0.5	0.3	0.4	0.2	0.3	0.2	0.2			
22DEC77	1244	-100	-102	-98	-102	-104	-104	-101	-100	63	63	20
		0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4			
22DEC77	1305	-99	-101	-97	-101	-104	-104	-100	-100	63	63	20
		0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4			
22DEC77	1328	-96	-98	-95	-98	-101	-101	-98	-97	63	63	20
		0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.5			
22DEC77	1349	-95	-96	-94	-97	-99	-99	-96	-94	63	63	20
		0.4	0.5	0.4	0.5	0.5	0.4	0.4	0.4			
22DEC77	1410	-94	-96	-93	-96	-98	-97	-95	-94	63	63	20
		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
22DEC77	1432	-93	-95	-92	-95	-97	-96	-94	-93	63	63	20
		0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5			
22DEC77	1454	-91	-93	-90	-93	-94	-94	-91	-90	63	63	2
		0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4			
23DEC77	845	-91	-95	-92	-94	-97	-96	-94	-91	63	63	2
		0.8	0.9	0.6	0.7	0.9	0.8	0.8	0.9			
23DEC77	852	-93	-97	-93	-96	-101	-99	-98	-95	63	63	2
		0.7	0.8	0.6	0.5	1.0	1.1	0.7	0.7			
23DEC77	858	-94	-98	-96	-97	-104	-102	-103	-99	63	63	2
		0.8	1.0	0.6	0.7	0.9	1.0	0.7	0.7			
23DEC77	903	-94	-98	-94	-96	-104	-101	-102	-98	63	63	2
		0.6	1.2	0.6	0.9	0.9	1.1	0.7	0.9			
23DEC77	923	-94	-99	-94	-99	-97	-98	-95	-95	63	63	2
		0.9	0.7	0.8	0.7	1.3	1.0	1.1	0.8			
23DEC77	928	-92	-98	-93	-98	-101	-102	-99	-99	63	63	2
		1.3	0.9	1.3	1.0	1.1	1.0	0.9	0.6			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
23DEC77	935	-92	-97	-92	-97	-101	-103	-99	-99	63	63	2
		1.1	1.1	1.0	1.1	0.9	0.8	0.9	0.7			
23DEC77	943	-93	-99	-94	-98	-100	-103	-99	-99	63	63	4
		1.5	1.0	0.9	0.9	1.2	0.8	1.1	0.8			
17JAN78	1514	--	-105	--	-102	--	-101	--	-99	63	66	4
		--	--	--	--	--	--	--	--			
18JAN78	1044	--	-103	--	-97	--	-107	--	-104	63	66	10
		--	--	--	--	--	--	--	--			
18JAN78	1113	--	-104	--	-99	--	-108	--	-104	63	66	10
		--	1.2	--	0.8	--	1.0	--	0.8			
18JAN78	1242	--	-101	--	-96	--	-101	--	-98	63	66	10
		--	1.1	--	0.7	--	0.9	--	0.8			
18JAN78	1313	--	-97	--	-92	--	-99	--	-96	63	66	10
		--	0.8	--	0.5	--	0.8	--	0.6			
18JAN78	1324	--	-96	--	-91	--	-99	--	-96	63	66	10
		--	0.9	--	0.7	--	0.6	--	0.7			
18JAN78	1338	--	-95	--	-91	--	-99	--	-96	63	66	10
		--	0.8	--	0.6	--	0.7	--	0.7			
18JAN78	1352	--	-97	--	-93	--	-98	--	-95	63	66	10
		--	0.8	--	0.6	--	0.7	--	0.6			
18JAN78	1407	--	-97	--	-93	--	-97	--	-94	63	66	10
		--	0.9	--	0.6	--	0.8	--	0.7			
18JAN78	1421	--	-97	--	-94	--	-96	--	-92	63	66	10
		--	0.8	--	0.7	--	0.9	--	0.7			
18JAN78	1435	--	-98	--	-94	--	-93	--	-89	63	66	10
		--	0.8	--	0.7	--	0.7	--	0.6			
18JAN78	1447	--	-97	--	-94	--	-90	--	-86	63	66	10
		--	0.8	--	0.7	--	0.6	--	0.5			
18JAN78	1500	--	-98	--	-94	--	-91	--	-87	63	66	10
		--	0.7	--	0.6	--	0.7	--	0.6			
18JAN78	1517	--	-98	--	-95	--	-93	--	-88	63	66	10
		--	1.0	--	1.0	--	0.7	--	0.5			
18JAN78	1545	--	-94	--	-90	--	-92	--	-88	63	63	2
		--	1.2	--	1.0	--	0.8	--	0.6			
19JAN78	1129	--	-94	--	-91	--	-94	--	-95	63	66	2
		--	0.3	--	0.2	--	0.4	--	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
19JAN78	1147	--	-94	--	-93	--	-92	--	-94	63	66	2
		--	0.3	--	0.3	--	0.3	--	0.3			
19JAN78	1154	--	-96	--	-93	--	-93	--	-93	63	66	2
		--	0.3	--	0.3	--	0.3	--	0.4			
19JAN78	1159	--	-96	--	-93	--	-94	--	-95	63	66	10
		--	0.3	--	0.2	--	0.4	--	0.4			
19JAN78	1325	--	-91	--	-90	--	-92	--	-93	63	63	10
		--	0.2	--	0.3	--	0.3	--	0.3			
19JAN78	1400	--	-91	--	-89	--	-94	--	-96	63	66	10
		--	0.2	--	0.2	--	0.3	--	0.3			
19JAN78	1412	--	-91	--	-89	--	-96	--	-97	63	66	20
		--	0.2	--	0.2	--	0.2	--	0.2			
19JAN78	1435	--	-91	--	-89	--	-98	--	-101	63	66	20
		--	0.1	--	0.1	--	0.2	--	0.1			
19JAN78	1458	--	-91	--	-90	--	-99	--	-102	63	66	20
		--	0.2	--	0.2	--	0.2	--	0.2			
19JAN78	1522	--	-91	--	-90	--	-100	--	-102	63	66	20
		--	0.2	--	0.2	--	0.2	--	0.2			
19JAN78	1543	--	-91	--	-89	--	-99	--	-99	63	66	2
		--	0.3	--	0.2	--	0.2	--	0.2			
20JAN78	1030	--	-100	--	-99	--	-98	--	-98	63	66	2
		--	0.4	--	0.4	--	0.4	--	0.3			
20JAN78	1042	--	-103	--	-102	--	-100	--	-101	63	66	2
		--	0.6	--	0.6	--	0.4	--	0.4			
20JAN78	1047	--	-103	--	-102	--	-99	--	-100	63	66	2
		--	0.7	--	0.5	--	0.4	--	0.5			
20JAN78	1053	--	-103	--	-101	--	-100	--	-99	63	66	10
		--	0.7	--	0.6	--	0.3	--	0.4			
20JAN78	1120	--	-96	--	-95	--	-94	--	-94	63	63	10
		--	0.6	--	0.6	--	0.4	--	0.3			
20JAN78	1137	--	-99	--	-97	--	-94	--	-94	63	63	20
		--	0.7	--	0.6	--	0.5	--	0.5			
20JAN78	1150	--	-98	--	-96	--	-94	--	-94	63	63	10
		--	0.5	--	0.5	--	0.5	--	0.4			
20JAN78	1213	--	-98	--	-96	--	-93	--	-93	63	63	2
		--	0.5	--	0.5	--	0.5	--	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
23JAN78	1349	--	-90	--	-84	--	-97	--	-94	63	66	2
		--	0.2	--	0.2	--	0.1	--	0.2			
23JAN78	1356	--	-91	--	-87	--	-96	--	-93	63	66	2
		--	0.3	--	0.2	--	0.2	--	0.2			
23JAN78	1404	--	-92	--	-88	--	-97	--	-95	63	66	2
		--	0.2	--	0.2	--	0.2	--	0.2			
23JAN78	1411	--	-94	--	-91	--	-97	--	-94	63	66	10
		--	0.3	--	0.2	--	0.1	--	0.1			
23JAN78	1440	--	-96	--	-94	--	-100	--	-97	63	63	10
		--	0.4	--	0.3	--	0.3	--	0.2			
23JAN78	1458	--	-96	--	-93	--	-100	--	-99	63	66	10
		--	0.4	--	0.3	--	0.4	--	0.2			
23JAN78	1517	--	-92	--	-88	--	-98	--	-96	63	66	20
		--	0.3	--	0.2	--	0.2	--	0.2			
23JAN78	1531	--	-88	--	-85	--	-96	--	-94	63	66	2
		--	0.2	--	0.2	--	0.2	--	0.1			
24JAN78	940	--	-90	--	-87	--	-92	--	-90	63	66	2
		--	0.4	--	0.4	--	0.7	--	0.5			
24JAN78	946	--	-90	--	-86	--	-90	--	-87	63	66	2
		--	0.6	--	0.5	--	0.5	--	0.5			
24JAN78	957	--	-90	--	-87	--	-89	--	-86	63	66	2
		--	0.5	--	0.4	--	0.5	--	0.3			
24JAN78	1003	--	-89	--	-85	--	-88	--	-86	63	66	10
		--	0.4	--	0.4	--	0.5	--	0.4			
24JAN78	1015	--	-86	--	--	--	-88	--	--	63	63	10
		--	0.3	--	--	--	0.5	--	--			
24JAN78	1032	--	--	--	-82	--	--	--	-86	63	63	20
		--	--	--	0.2	--	--	--	0.3			
24JAN78	1117	--	-87	--	-81	--	-94	--	-92	63	66	10
		--	0.5	--	0.3	--	0.5	--	0.4			
24JAN78	1138	--	-89	--	-83	--	-93	--	-90	63	66	20
		--	0.5	--	0.3	--	0.6	--	0.4			
24JAN78	1200	--	-89	--	-85	--	-93	--	-93	63	66	2
		--	0.5	--	0.3	--	0.4	--	0.3			
25JAN78	958	--	-100	--	-98	--	-97	--	-97	63	66	2
		--	0.7	--	0.5	--	0.7	--	0.5			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
25JAN78	1004	--	-100	--	-96	--	-97	--	-97	63	66	2
		--	0.5	--	0.7	--	0.7	--	0.6			
25JAN78	1012	--	-100	--	-97	--	-97	--	-96	63	66	2
		--	0.7	--	0.6	--	0.7	--	0.5			
25JAN78	1018	--	-100	--	-96	--	-98	--	-96	63	66	10
		--	0.7	--	0.6	--	0.5	--	0.5			
25JAN78	1025	--	-98	--	--	--	-95	--	--	63	63	10
		--	0.9	--	--	--	0.8	--	--			
25JAN78	1038	--	--	--	-93	--	--	--	-94	63	63	20
		--	--	--	0.8	--	--	--	0.7			
25JAN78	1118	--	-99	--	-97	--	-93	--	-93	63	66	20
		--	1.2	--	1.0	--	0.9	--	0.9			
25JAN78	1143	--	-99	--	-96	--	-92	--	-92	63	66	20
		--	1.5	--	1.4	--	0.8	--	0.8			
25JAN78	1243	--	-89	--	-86	--	-87	--	-88	63	66	20
		--	1.7	--	1.6	--	0.9	--	0.9			
25JAN78	1309	--	-90	--	-87	--	-88	--	-89	63	66	20
		--	1.4	--	1.4	--	0.9	--	0.9			
25JAN78	1348	--	-93	--	-90	--	-91	--	-92	63	66	20
		--	1.2	--	1.2	--	0.7	--	0.7			
25JAN78	1413	--	-94	--	-91	--	-93	--	-93	63	66	20
		--	1.4	--	1.4	--	0.8	--	0.8			
25JAN78	1437	--	-95	--	-92	--	-93	--	-94	63	66	20
		--	1.3	--	1.2	--	0.8	--	0.8			
25JAN78	1458	--	-95	--	-92	--	-94	--	-95	63	66	20
		--	1.1	--	0.9	--	0.8	--	0.7			
25JAN78	1521	--	-99	--	-96	--	-95	--	-96	63	66	20
		--	1.2	--	1.1	--	0.8	--	0.8			
25JAN78	1544	--	-100	--	-96	--	-98	--	-98	63	66	20
		--	0.9	--	0.9	--	0.8	--	0.8			
25JAN78	1606	--	-102	--	-98	--	-102	--	-102	63	66	10
		--	1.0	--	0.9	--	0.9	--	0.8			
27JAN78	1045	-103	-107	-98	-103	-104	-106	-99	-104	66	66	10
		0.7	0.7	0.5	0.6	0.6	0.6	0.5	0.5			
27JAN78	1100	-105	-109	-100	-104	-104	-106	-99	-104	66	66	10
		0.6	--	0.6	0.7	0.5	0.5	0.4	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
27JAN78	1113	-106	-109	-100	-105	-106	-109	-101	-107	66	66	10
		0.8	--	0.5	0.6	0.5	0.5	0.4	0.5			
27JAN78	1124	-106	--	--	--	-106	--	--	--	63	66	10
		0.9	--	--	--	0.6	--	--	--			
27JAN78	1140	--	-109	--	--	--	-108	--	--	63	63	10
		--	--	--	--	--	--	--	--			
27JAN78	1151	--	--	-100	--	--	--	-101	--	63	63	10
		--	--	0.6	--	--	--	0.5	--			
27JAN78	1205	--	--	--	-104	--	--	--	-107	63	63	2
		--	--	--	0.6	--	--	--	0.5			
27JAN78	1308	-107	-108	-101	-103	-109	-107	-103	-109	66	66	2
		0.8	0.6	0.6	0.6	--	0.7	0.4	0.5			
27JAN78	1312	-106	-106	-101	-103	-109	-106	-103	-107	66	66	2
		0.6	0.6	0.5	0.4	--	0.5	0.3	--			
27JAN78	1320	-107	-109	-101	-103	-109	-107	-104	-110	66	66	2
		0.8	--	0.7	0.5	--	0.5	0.5	--			
27JAN78	1327	-109	-100	-101	-103	-108	-105	-103	-107	66	66	2
		0.8	0.7	0.5	0.6	--	0.7	0.5	0.7			
27JAN78	1342	-107	-109	-100	-104	-106	-109	-102	-110	66	66	2
		0.9	--	0.6	0.7	0.8	--	0.6	--			
27JAN78	1350	-105	-108	-99	-104	-106	-109	-103	-110	66	66	2
		0.7	0.7	0.8	0.5	0.8	--	0.6	--			
27JAN78	1402	-105	-109	-98	-104	-107	-110	-103	-110	66	66	2
		0.9	--	0.5	0.7	0.7	--	0.5	--			
27JAN78	1410	-105	-109	-99	-104	-108	-110	-103	-110	66	66	2
		0.9	0.6	0.5	0.7	1.0	--	0.7	--			
30JAN78	1010	-99	-104	-93	-100	-97	-101	-91	-98	66	66	2
		0.8	0.6	0.6	0.4	0.9	0.8	0.8	0.7			
30JAN78	1022	-99	-104	-95	-101	-95	-99	-89	-97	66	66	2
		0.7	0.6	0.7	0.5	0.9	0.5	0.6	0.7			
30JAN78	1027	-99	-104	-94	-101	-94	-98	-88	-96	66	66	2
		0.7	0.8	0.7	0.7	0.7	0.7	0.6	0.7			
30JAN78	1033	-99	-104	-94	-100	-95	-99	-89	-97	66	66	2
		0.9	0.6	0.6	0.5	0.8	0.5	0.7	0.7			
30JAN78	1039	-103	-103	-98	-98	-98	-97	-92	-95	66	66	2
		1.0	0.7	0.6	0.7	0.8	0.9	0.8	0.6			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
30JAN78	1044	-100	-103	-97	-98	-97	-97	-91	-95	66	66	2
		0.8	0.9	0.4	0.7	0.8	0.9	0.6	0.7			
30JAN78	1050	-100	-101	-95	-96	-96	-96	-91	-94	66	66	2
		0.9	0.9	0.6	0.6	0.7	0.8	1.8	0.9			
30JAN78	1057	-99	-101	-96	-96	-97	-96	-92	-95	66	66	10
		0.7	0.9	0.5	0.5	0.9	0.7	0.7	0.8			
30JAN78	1105	--	-96	--	--	--	-94	--	--	66	63	10
		--	1.0	--	--	--	0.8	--	--			
30JAN78	1120	--	--	--	-91	--	--	--	-92	66	63	10
		--	--	--	0.8	--	--	--	0.7			
30JAN78	1134	-93	--	--	--	-92	--	--	--	63	63	10
		0.9	--	--	--	0.9	--	--	--			
30JAN78	1146	--	--	-88	--	--	--	-87	--	63	63	20
		--	--	0.7	--	--	--	0.7	--			
30JAN78	1156	-91	-93	-85	-87	-91	-92	-85	-90	66	66	20
		0.8	0.9	0.6	0.6	0.8	0.7	0.6	0.6			
30JAN78	1303	-90	-93	-85	-89	-92	-94	-86	-91	66	66	20
		0.7	0.5	0.6	0.5	0.7	0.6	0.5	0.5			
30JAN78	1326	-91	-93	-86	-89	-93	-93	-88	-93	66	66	20
		0.5	0.7	0.6	0.6	0.6	0.7	0.5	0.4			
30JAN78	1347	-92	-95	-87	-91	-96	-98	-90	-97	66	66	20
		0.6	0.7	0.4	0.5	0.7	0.6	0.5	0.5			
30JAN78	1411	-89	-92	-84	-87	-95	-96	-89	-95	66	66	20
		0.7	0.8	0.6	0.7	0.7	0.7	0.6	0.6			
30JAN78	1435	-88	-92	-84	-87	-94	-96	-89	-96	66	66	20
		0.7	0.7	0.7	0.7	0.8	0.7	0.6	0.7			
30JAN78	1458	-89	-92	-84	-88	-95	-97	-91	-96	66	66	20
		0.9	0.9	0.7	0.8	0.8	0.7	0.6	0.6			
30JAN78	1520	-87	-91	-82	-86	-92	-94	-87	-92	66	66	20
		0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5			
30JAN78	1541	-85	-89	-80	-84	-90	-92	-85	-91	66	66	2
		0.8	0.8	0.7	0.7	0.6	0.6	0.4	0.5			
31JAN78	1051	-87	-92	-80	-86	-96	-98	-91	-96	66	66	2
		0.2	0.2	0.2	0.1	0.3	0.4	0.2	0.2			
31JAN78	1100	-89	-95	-83	-88	-95	-96	-91	-95	66	66	2
		0.1	0.4	0.2	0.2	0.2	0.3	0.1	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
31JAN78	1108	-92	-96	-84	-91	-94	-96	-89	-94	66	66	2
		0.2	0.5	0.1	0.3	0.3	0.3	0.3	0.3			
31JAN78	1114	-93	-97	-86	-90	-94	-96	-90	-93	66	66	2
		0.3	0.5	0.2	0.1	0.3	0.4	0.3	0.3			
31JAN78	1124	-91	-102	-85	-96	-91	-98	-86	-96	66	66	2
		0.3	0.5	0.2	0.3	0.3	0.4	0.2	0.3			
31JAN78	1132	-92	-101	-85	-96	-92	-99	-88	-96	66	66	2
		0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.3			
31JAN78	1138	-92	-103	-86	-96	-94	-99	-89	-96	66	66	2
		0.5	0.4	0.3	0.3	0.4	0.4	0.3	0.3			
31JAN78	1146	-93	-102	-88	-96	-94	-101	-91	-98	66	66	10
		0.4	0.5	0.4	0.4	0.3	0.4	0.3	0.4			
31JAN78	1310	-92	--	--	--	-92	--	--	--	63	66	10
		0.5	--	--	--	0.3	--	--	--			
31JAN78	1325	--	--	-85	--	--	--	-88	--	63	66	10
		--	--	0.4	--	--	--	0.2	--			
31JAN78	1339	--	-97	--	--	--	-96	--	--	63	63	10
		--	0.5	--	--	--	0.3	--	--			
31JAN78	1352	--	--	--	-90	--	--	--	-93	63	63	20
		--	--	--	0.1	--	--	--	0.3			
31JAN78	1405	-93	-99	-86	-94	-95	-99	-91	-98	66	66	20
		0.5	0.5	0.3	0.4	0.5	0.5	0.3	0.3			
31JAN78	1427	-92	-98	-84	-92	-94	-98	-90	-96	66	66	2
		0.2	0.5	0.3	0.2	0.5	0.5	0.3	0.4			
1FEB78	921	-99	-105	-96	-99	-99	-102	-95	-100	66	66	2
		0.9	1.2	0.7	1.0	0.7	0.7	0.7	0.6			
1FEB78	927	-99	-105	-96	-100	-98	-101	-94	-99	66	66	2
		0.9	0.9	0.5	1.0	0.3	0.4	0.3	0.6			
1FEB78	933	-103	-108	-97	-102	-99	-102	-95	-99	66	66	2
		0.9	1.0	0.8	0.9	0.7	0.8	0.5	0.7			
1FEB78	940	-101	-106	-97	-100	-99	-101	-94	-99	66	66	2
		1.1	1.1	0.8	1.0	0.7	0.8	0.5	0.6			
1FEB78	948	-98	-106	-93	-101	-97	-103	-93	-101	66	66	2
		1.1	1.2	1.1	1.1	0.5	0.6	0.6	0.6			
1FEB78	955	-96	-104	-91	-99	-98	-103	-93	-100	66	66	2
		1.0	1.2	1.4	0.8	0.7	0.7	0.6	0.5			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
1FEB78	1003	-97	-105	-92	-101	-98	-103	-94	-102	66	66	2
		0.9	1.2	0.9	1.0	0.7	0.7	0.5	0.5			
1FEB78	1009	-97	-104	-91	-100	-97	-104	-93	-101	66	66	10
		1.3	1.2	1.2	1.2	0.7	0.7	0.6	0.7			
1FEB78	1035	-93	-99	-88	-94	-96	-101	-90	-97	66	66	10
		0.9	0.9	0.8	0.9	0.6	0.7	0.6	0.6			
1FEB78	1047	-92	-98	-87	-93	-95	-100	-90	-97	66	66	2
		0.9	0.8	0.7	0.8	0.6	0.6	0.6	0.6			
3FEB78	945	-98	-103	-95	-98	-104	-108	-98	-103	66	66	2
		0.8	0.6	0.5	0.2	0.4	0.3	0.3	0.2			
3FEB78	952	-96	-97	-93	-94	-108	-107	-100	-102	66	66	2
		0.7	0.7	0.5	0.5	0.5	0.7	0.4	0.3			
3FEB78	958	-98	-98	-94	-95	-107	-105	-102	-103	63	63	2
		0.6	0.7	0.6	0.5	0.7	0.5	0.5	0.5			
3FEB78	1005	-99	-103	-93	-99	-110	-110	-103	-110	63	63	2
		0.7	0.7	0.5	0.5	--	--	0.4	--			
3FEB78	1036	-94	-103	-90	-99	-105	-110	-100	-110	63	63	2
		0.6	0.7	0.6	0.4	0.7	0.2	0.5	--			
3FEB78	1041	-95	-100	-90	-98	-105	-110	-100	-109	63	63	2
		0.7	0.5	0.5	0.5	0.4	--	0.3	0.6			
3FEB78	1050	-94	-104	-90	-99	-109	-110	-102	-110	66	66	2
		0.6	0.7	0.5	0.5	0.6	--	0.5	--			
3FEB78	1057	-94	-103	-88	-98	-110	-110	-102	-110	66	66	2
		0.5	0.7	0.5	0.5	--	--	0.4	--			
13FEB78	1355	-106	-104	-93	-98	-100	-103	-95	-96	66	66	2
		0.3	0.2	0.1	0.2	0.2	0.2	0.1	0.2			
13FEB78	1402	-104	-103	-95	-98	-100	-101	-96	-98	66	66	2
		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2			
13FEB78	1408	-109	-104	-93	-98	-102	-102	-96	-95	66	66	2
		0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1			
13FEB78	1413	-105	-103	-94	-97	-100	-102	-94	-97	66	66	2
		0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.2			
13FEB78	1423	-102	-105	-91	-98	-96	-104	-93	-98	66	66	2
		0.3	0.1	0.1	0.1	0.2	0.1	0.2	0.2			
13FEB78	1429	-102	-106	-91	-98	-95	-103	-90	-98	66	66	2
		0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
13FEB78	1435	-102	-106	-91	-98	-96	-104	-90	-97	66	66	2
		0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1			
13FEB78	1442	-102	-106	-91	-98	-96	-104	-92	-98	66	66	10
		0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.1			
13FEB78	1511	-104	-107	-93	-98	-98	-102	-93	-97	66	66	20
		0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1			
13FEB78	1523	-101	-104	-92	-97	-96	-101	-91	-95	66	66	20
		0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1			
13FEB78	1545	-99	-104	-91	-97	-97	-101	-92	-95	66	66	10
		0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
13FEB78	1612	-100	-105	-92	-99	-95	-102	-91	-96	66	66	2
		0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1			
14FEB78	848	-90	-97	-86	-95	-95	-103	-94	-101	63	63	2
		0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1			
14FEB78	855	-89	-97	-84	-94	-97	-104	-93	-99	63	63	2
		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1			
14FEB78	902	-90	-97	-84	-94	-97	-103	-93	-100	63	63	2
		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1			
14FEB78	908	-91	-98	-87	-95	-97	-104	-94	-99	63	63	2
		0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1			
14FEB78	935	-96	-98	-92	-94	-100	-103	-97	-100	63	63	2
		0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1			
14FEB78	941	-96	-97	-92	-93	-100	-103	-95	-98	63	63	2
		0.1	0.2	0.3	0.2	0.1	0.2	0.1	0.1			
14FEB78	948	-96	-98	-92	-94	-100	-104	-97	-100	63	63	2
		0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1			
14FEB78	954	-97	-99	-92	-94	-99	-103	-96	-100	63	63	20
		0.2	0.4	0.2	0.3	0.1	0.2	0.1	0.0			
14FEB78	1006	-97	-103	-92	-99	-99	-107	-96	-103	63	63	20
		0.5	0.5	0.4	0.4	0.2	0.2	0.1	0.2			
14FEB78	1029	-98	-103	-93	-99	-101	-108	-98	-103	63	63	20
		0.4	0.4	0.3	0.4	0.2	0.2	0.1	0.1			
14FEB78	1051	-98	-103	-94	-99	-101	-105	-97	-102	63	63	20
		0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1			
14FEB78	1115	-100	-103	-94	-99	-102	-107	-98	-103	63	63	20
		0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
14FEB78	1140	-101	-104	-93	-99	-103	-107	-99	-103	63	63	20
		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1			
14FEB78	1228	-103	-105	-96	-100	-101	-104	-98	-101	63	63	20
		0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1			
14FEB78	1328	-104	-106	-95	-99	-100	-103	-95	-98	63	63	20
		0.2	0.3	0.1	0.1	0.2	0.2	0.1	0.1			
14FEB78	1352	-103	-105	-94	-99	-99	-103	-96	-99	63	63	20
		0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1			
14FEB78	1415	-104	-104	-94	-99	-99	-102	-95	-98	63	63	10
		0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2			
14FEB78	1453	-103	-103	-93	-98	--	-101	--	-96	63	63	10
		0.2	0.1	0.1	0.1	--	0.2	--	0.1			
14FEB78	1510	-102	-103	-92	-98	-99	-101	-94	-98	63	63	20
		0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1			
14FEB78	1522	-103	-104	-93	-98	-103	-103	-97	-101	63	63	20
		0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2			
14FEB78	1551	-102	-103	-93	-97	-102	-102	-97	-101	63	63	10
		0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2			
14FEB78	1615	-101	-103	-92	-96	-99	-101	-96	-99	63	63	2
		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2			
15FEB78	830	-86	-88	-79	-83	-92	-94	-86	-93	63	63	2
		0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1			
15FEB78	836	-87	-90	-80	-84	-91	-94	-88	-92	63	63	2
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
15FEB78	842	-87	-90	-81	-82	-93	-91	-87	-89	63	63	2
		0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1			
15FEB78	848	-88	-87	-81	-83	-93	-93	-88	-91	63	63	2
		0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2			
15FEB78	923	-86	-94	-79	-90	-93	-98	-87	-85	63	63	2
		0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2			
15FEB78	929	-89	-92	-79	-88	-94	-99	-88	-95	63	63	2
		0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.1			
15FEB78	935	-86	-92	-80	-87	-97	-102	-91	-99	63	63	2
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
15FEB78	943	-86	-93	-79	-88	-95	-102	-91	-99	63	63	20
		0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
15FEB78	1418	-102	-98	-85	-91	-95	-97	-91	-96	63	63	20
		0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2			
15FEB78	1450	-101	-98	-84	-90	-95	-96	-91	-96	63	63	20
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			
15FEB78	1510	-100	-99	-83	-91	-96	-97	-92	-96	63	63	20
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			
15FEB78	1535	-102	-100	-85	--	-96	-93	-92	-94	63	63	20
		0.2	0.2	0.2	--	0.2	0.2	0.2	0.2			
15FEB78	1605	-101	-99	-85	-93	-95	-96	-91	-95	63	63	2
		0.2	0.3	0.2	0.3	0.3	0.4	0.3	0.3			
16FEB78	841	-107	-110	-100	-107	-106	-109	-104	-107	63	63	2
		1.0	--	0.9	0.6	0.8	--	0.7	0.6			
16FEB78	848	-109	-110	-100	-106	-106	-109	-103	-108	63	63	2
		--	--	0.7	0.7	0.9	--	0.6	0.4			
16FEB78	905	-108	-110	-99	-105	-103	-108	-101	-108	63	63	2
		0.6	--	0.5	0.5	0.7	0.5	0.5	0.5			
16FEB78	913	-107	-109	-98	-104	-104	-104	-101	-106	63	63	2
		0.8	--	0.4	0.2	0.5	0.1	0.5	0.1			
16FEB78	927	-106	-107	-98	-103	-103	-104	-101	-104	63	63	2
		0.5	0.5	0.3	0.4	0.4	0.3	0.3	0.4			
16FEB78	935	-109	-110	-99	-103	-104	-104	-102	-106	63	63	2
		--	--	0.3	0.4	0.8	0.6	0.6	0.6			
16FEB78	939	-107	-107	-98	-102	-104	-104	-102	-105	63	63	2
		0.5	0.5	0.3	0.4	0.6	0.4	0.5	0.5			
16FEB78	946	-107	-107	-98	-99	-105	-106	-103	-106	63	63	10
		0.4	0.5	0.4	0.5	0.5	0.5	0.4	0.5			
16FEB78	1011	-104	-108	-94	-100	-104	-103	-100	-107	63	63	10
		0.4	0.2	0.3	0.3	0.5	0.5	0.4	0.5			
16FEB78	1126	-110	-106	-93	-98	-102	-103	-99	-104	63	63	20
		--	0.4	0.2	0.3	0.3	0.2	0.3	0.3			
16FEB78	1201	-110	-108	-94	-99	-99	-101	-104	-98	63	63	20
		--	0.5	0.4	0.5	0.5	0.4	0.4	0.3			
16FEB78	1301	-110	-101	-94	-93	-104	-104	-99	-105	63	63	20
		--	0.5	0.3	0.4	0.5	0.6	0.4	0.6			
16FEB78	1330	-107	-98	-89	-90	-98	-99	-96	-99	63	63	20
		0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
16FEB78	1405	-100	-97	-87	-89	-92	-96	-89	-94	63	63	20
		0.4	0.5	0.3	0.5	0.4	0.4	0.3	0.3			
16FEB78	1427	-99	-96	-86	-89	-91	-95	-88	-94	63	63	20
		0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3			
16FEB78	1449	-99	-97	-86	-89	-90	-94	-87	-93	63	63	20
		0.5	0.5	0.3	0.4	0.3	0.3	0.2	0.3			
16FEB78	1511	-98	-97	-86	-90	-90	-94	-86	-92	63	63	20
		0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3			
16FEB78	1532	-98	-98	-86	-91	-98	-94	-86	-92	63	63	20
		0.4	0.5	0.3	0.4	0.4	0.3	0.3	0.3			
16FEB78	1554	-98	-99	-87	-91	-89	-94	-85	-92	63	63	2
		0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4			
17FEB78	902	-88	-95	-82	-90	-97	-105	-93	-101	63	63	2
		0.3	0.3	0.2	0.4	0.6	0.4	0.4	0.3			
17FEB78	910	-88	-94	-81	-91	-98	-104	-93	-101	63	63	2
		0.3	0.3	0.2	0.3	0.6	0.5	0.4	0.3			
17FEB78	917	-88	-93	-80	-88	-99	-104	-94	-101	63	63	2
		0.2	0.1	0.3	0.2	0.5	0.4	0.3	0.2			
17FEB78	923	-87	-93	-81	-89	-99	-104	-95	-102	63	63	2
		0.4	0.3	0.2	0.3	0.6	0.5	0.4	0.4			
17FEB78	943	-89	-92	-83	-86	-96	-99	-94	-99	63	63	2
		0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.4			
17FEB78	947	-87	-92	-82	-87	-95	-99	-91	-98	63	63	2
		0.2	0.2	0.2	0.3	0.4	0.3	0.2	0.3			
17FEB78	1012	-90	-94	-84	-89	-96	-99	-92	-97	63	63	20
		0.4	0.4	0.3	0.3	0.4	0.5	0.3	0.3			
17FEB78	1100	-87	-94	-80	-88	-94	-97	-89	-94	63	63	20
		0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.5			
17FEB78	1125	-87	-93	-80	-86	-93	-96	-89	-93	63	63	20
		0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.5			
17FEB78	1229	-87	-93	-82	-87	-89	-95	-84	-92	63	63	20
		0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.4			
17FEB78	1300	-87	-93	-82	-87	-90	-95	-85	-92	63	63	2
		0.5	0.4	0.4	0.4	0.6	0.5	0.5	0.5			
21FEB78	1353	-99	-93	-94	-91	-94	-91	-96	-93	63	63	2
		0.3	0.2	0.3	0.2	0.2	0.3	0.2	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
21FEB78	1359	-99	-94	-94	-92	-95	-93	-98	-96	63	63	2
		0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.4			
21FEB78	1406	-98	-97	-94	-94	-93	-93	-96	-95	63	63	2
		0.3	0.2	0.3	0.4	0.2	0.3	0.3	0.2			
21FEB78	1413	-99	-96	-95	-95	-93	-93	-95	-93	63	63	10
		0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2			
21FEB78	1545	-96	-98	-93	-98	-100	-104	-104	-107	63	63	20
		0.4	0.2	0.4	0.3	0.2	0.3	0.3	0.4			
22FEB78	1027	-110	-110	-100	-108	-110	-110	-110	-110	63	63	20
		--	--	0.7	0.3	--	--	--	--			
22FEB78	1155	-110	-108	-98	-105	-110	-108	-110	-110	63	63	20
		0.3	1.2	0.8	1.0	--	0.7	--	--			
23FEB78	1210	-86	-90	-83	-92	-97	-102	-99	-103	63	63	20
		0.3	0.4	0.3	0.4	0.4	0.5	0.5	0.5			
23FEB78	1232	-87	-91	-85	-93	-96	-103	-99	-103	63	63	20
		0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.5			
23FEB78	1255	-91	-95	-88	-96	-99	-106	-102	-108	63	63	20
		0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5			
23FEB78	1325	-96	-95	-92	-96	-103	-108	-108	-105	63	66	20
		0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.5			
23FEB78	1348	-97	-96	-93	-97	-101	-102	-104	-103	63	66	20
		0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.4			
23FEB78	1412	-98	-97	-94	-97	-103	-101	-107	-101	63	66	20
		0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.4			
23FEB78	1435	-101	-98	-96	-98	-101	-98	-103	-97	63	66	20
		0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2			
23FEB78	1458	-99	-96	-95	-96	-100	-98	-102	-98	63	66	2
		0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.3			
23FEB78	1540	-95	-94	-92	-95	-99	-99	-102	-99	63	66	2
		0.2	0.2	0.2	0.2	0.3	0.2	0.5	0.2			
23FEB78	1546	-92	-94	-98	-95	-99	-98	-102	-98	63	66	2
		0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2			
23FEB78	1552	-94	-94	-90	-94	-97	-97	-100	-97	63	66	2
		0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2			
23FEB78	1604	-97	-92	-93	-93	-101	-97	-104	-97	63	66	2
		0.2	0.2	0.2	0.1	0.3	0.3	0.3	0.2			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
23FEB78	1610	-95	-91	-94	-93	-100	-97	-102	-97	63	63	2
		0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3			
23FEB78	1617	-95	-91	-93	-92	-98	-95	-100	-94	63	66	2
		0.2	0.1	0.2	0.2	0.3	0.3	0.3	0.2			
23FEB78	1623	-94	-91	-93	-92	-99	-95	-100	-96	63	66	15
		0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.1			
24FEB78	908	-101	-96	-98	-96	-99	-98	-101	-98	63	66	15
		1.0	1.1	0.8	1.1	0.8	0.8	0.8	0.7			
24FEB78	928	-101	-97	-99	-97	-99	-97	-101	-97	63	66	15
		0.9	1.0	0.9	1.0	0.8	0.7	0.8	0.7			
24FEB78	950	-102	-100	-99	-101	-98	-99	-99	-98	63	66	15
		0.9	0.9	0.9	0.9	0.7	0.5	0.8	0.5			
24FEB78	1013	-103	-99	-98	-99	-99	-99	-100	-98	63	66	20
		0.7	0.6	0.6	0.7	0.6	0.4	0.6	0.5			
24FEB78	1115	-99	-93	-95	-93	-98	-97	-99	-97	63	66	20
		0.7	0.7	0.6	0.7	0.6	0.6	0.5	0.6			
24FEB78	1137	-99	-93	-95	-92	-97	-95	-99	-96	63	66	10
		0.6	0.7	0.6	0.8	0.6	0.6	0.6	0.6			
25FEB78	1121	-103	-109	-103	-106	-106	-101	-109	-99	63	66	10
		0.7	--	0.8	0.7	0.5	0.5	0.3	0.5			
25FEB78	1133	-104	-110	-104	-107	-105	-101	-106	-99	63	66	10
		0.7	--	0.7	0.7	0.5	0.6	0.5	0.5			
25FEB78	1145	-104	-110	-106	-109	-104	-101	-105	-98	63	66	10
		0.6	--	0.6	--	0.5	0.5	0.5	0.5			
25FEB78	1200	-103	-110	-105	-108	-105	-102	-105	-98	63	66	10
		0.5	0.0	0.5	0.2	0.4	0.5	0.5	0.5			
25FEB78	1213	-104	-110	-106	-107	-106	-102	-106	-99	63	66	20
		0.4	--	0.4	0.5	0.4	0.5	0.4	0.5			
25FEB78	1230	-103	-109	-104	-108	-104	-101	-105	-99	63	66	10
		0.3	0.1	0.3	0.4	0.5	0.5	0.4	0.5			
26FEB78	1113	-107	-102	-99	-103	-105	-108	-109	-110	63	66	10
		0.9	0.9	1.0	1.0	0.5	0.6	--	--			
26FEB78	1136	-102	-99	-96	-100	-105	-108	-110	-109	63	66	10
		1.0	0.9	0.9	0.9	0.5	0.6	--	--			
26FEB78	1150	-100	-99	-96	-99	-104	-108	-110	-109	63	66	10
		1.0	0.9	0.9	0.9	0.6	0.6	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
26FEB78	1202	-101	-99	-96	-99	-104	-108	-109	-110	63	66	10
		0.9	0.9	0.8	1.0	0.6	0.7	0.4	0.0			
26FEB78	1214	-100	-99	-95	-99	-103	-107	-108	-110	63	66	10
		0.9	0.8	0.7	0.8	0.6	0.7	0.7	--			
26FEB78	1230	-99	-99	-93	-99	-103	-106	-107	-109	63	66	20
		0.7	0.7	0.8	0.7	0.6	0.6	0.6	0.5			
26FEB78	1243	-99	-99	-94	-99	-103	-106	-108	-109	63	66	20
		0.9	0.8	0.8	0.8	0.5	0.7	0.7	--			
26FEB78	1305	-99	-99	-94	-99	-103	-106	-109	-109	63	66	20
		1.2	1.1	1.1	1.0	0.5	0.7	1.1	1.0			
26FEB78	1423	-97	-97	-92	-97	-103	-105	-108	-108	63	66	20
		1.1	1.1	2.1	1.1	0.7	0.8	0.2	0.5			
26FEB78	1445	-100	-99	-94	-99	-102	-105	-107	-107	63	66	10
		0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.7			
27FEB78	850	-96	-97	-93	-98	-99	-99	-100	-99	63	66	20
		0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4			
27FEB78	1134	-98	-95	-92	-96	-98	-98	-100	-97	63	66	10
		0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4			
28FEB78	955	--	-95	--	-96	--	-96	--	-95	63	68	10
		--	0.3	--	0.2	--	0.3	--	0.3			
28FEB78	1008	--	-101	--	-102	--	-105	--	-101	63	63	10
		--	0.3	--	0.4	--	0.4	--	0.4			
28FEB78	1020	--	-95	--	-97	--	-96	--	-97	63	68	10
		--	0.2	--	0.2	--	0.3	--	0.4			
28FEB78	1044	--	-96	--	-97	--	-99	--	-100	63	68	10
		--	0.2	--	0.3	--	0.3	--	0.4			
28FEB78	1055	--	-103	--	-104	--	-104	--	-108	63	63	10
		--	0.4	--	0.4	--	0.4	--	0.3			
28FEB78	1107	--	-96	--	-96	--	-98	--	-99	63	68	10
		--	0.3	--	0.2	--	0.4	--	0.5			
28FEB78	1120	--	-104	--	-104	--	-105	--	-109	63	63	10
		--	0.3	--	0.3	--	0.4	--	0.2			
28FEB78	1132	--	-97	--	-98	--	-99	--	-101	63	68	10
		--	0.2	--	0.2	--	0.3	--	0.3			
28FEB78	1145	--	-99	--	-100	--	-101	--	-103	63	63	15
		--	0.3	--	0.3	--	0.3	--	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
1MAR78	919	-104	-99	-99	-99	-98	-97	-99	-96	63	66	15
		0.4	0.4	0.3	0.4	0.2	0.3	0.2	0.3			
1MAR78	949	-109	-100	-101	-98	-101	-98	-102	-98	63	66	15
		0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3			
1MAR78	1010	-106	-100	-98	-99	-98	-99	-99	-98	63	66	15
		0.5	0.3	0.3	0.3	0.4	0.4	0.4	0.4			
1MAR78	1029	-107	-101	-98	-100	-99	-99	-100	-100	63	66	4
		0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3			
1MAR78	1335	-98	-99	-97	-98	-97	-97	-99	-99	63	68	4
		0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.4			
1MAR78	1345	-98	-99	-96	-98	-97	-97	-99	-98	63	68	4
		0.6	0.4	0.5	0.5	0.4	0.4	0.4	0.4			
1MAR78	1353	-98	-99	-96	-99	-95	-98	-97	-98	63	68	4
		0.6	0.8	0.5	0.8	0.4	0.3	0.3	0.4			
1MAR78	1400	-99	-102	-97	-100	-95	-99	-98	-99	63	68	4
		0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.3			
1MAR78	1407	-98	-102	-97	-99	-95	-98	-97	-98	63	68	4
		0.5	0.6	0.6	0.4	0.3	0.4	0.3	0.4			
1MAR78	1414	-97	-102	-96	-100	-94	-97	-95	-96	63	68	4
		0.5	0.6	0.5	0.4	0.3	0.4	0.4	0.4			
1MAR78	1421	-98	-102	-96	-100	-94	-98	-95	-98	63	68	4
		0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3			
1MAR78	1427	-99	-103	-97	-100	-96	-100	-97	-99	63	68	4
		0.5	0.6	0.5	0.5	0.3	0.3	0.3	0.3			
1MAR78	1433	-99	-101	-98	-99	-96	-100	-97	-99	63	68	4
		0.6	0.5	0.6	0.5	0.3	0.4	0.3	0.3			
1MAR78	1439	-99	-102	-97	-99	-98	-101	-100	-103	63	68	4
		0.5	0.5	0.4	0.4	0.3	0.4	0.4	0.5			
1MAR78	1445	-98	-100	-97	-98	-98	-103	-100	-103	63	68	4
		0.4	0.4	0.4	0.3	0.2	0.4	0.2	0.5			
1MAR78	1453	-99	-99	-98	-98	-99	-103	-100	-103	63	68	15
		0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4			
1MAR78	1502	-101	-100	-100	-98	-102	-103	-103	-104	63	66	15
		0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.5			
1MAR78	1522	-100	-97	-99	-96	-99	-99	-101	-100	63	66	15
		0.4	0.4	0.3	0.4	0.3	0.4	0.3	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
1MAR78	1555	-98	-102	-95	-100	-97	-102	-99	-102	63	66	15
		0.4	0.5	0.3	0.4	0.4	0.4	0.4	0.4			
1MAR78	1614	-104	-110	-101	-108	-103	-109	-108	-100	63	66	15
		0.5	0.4	0.3	0.3	0.3	0.2	0.3	0.3			
2MAR78	847	-79	-88	-77	-89	-88	-96	-90	-95	63	66	15
		0.2	0.4	0.3	0.4	0.4	0.4	0.4	0.5			
2MAR78	907	-81	-90	-78	-90	-89	-97	-92	-97	63	63	15
		0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.5			
2MAR78	937	-92	-92	-88	-92	-92	-93	-94	-93	63	66	15
		0.5	0.6	0.4	0.6	0.4	0.5	0.5	0.5			
2MAR78	956	-94	-92	-90	-92	-93	-95	-95	-95	63	66	15
		0.7	0.8	0.7	0.8	0.4	0.5	0.4	0.6			
10MAR78	903	-83	-86	-79	-84	-85	-87	-88	-89	63	66	15
		0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1			
10MAR78	923	-87	-87	-82	-87	-86	-86	-89	-89	63	66	15
		0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1			
10MAR78	945	-85	-87	-81	-87	-85	-88	-87	-90	63	66	15
		0.2	0.3	0.3	0.3	0.2	0.1	0.2	0.1			
10MAR78	1005	-87	-88	-80	-89	-85	-89	-87	-91	63	66	15
		0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.1			
10MAR78	1507	-87	-90	-85	-91	-95	-101	-98	-104	63	66	15
		0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1			
10MAR78	1525	-85	-89	-84	-89	-97	-103	-100	-110	63	66	15
		0.1	0.2	0.1	0.2	0.2	0.2	0.2	--			
10MAR78	1545	-84	-90	-81	-91	-96	-104	-99	-110	63	66	15
		0.1	0.1	0.1	0.1	0.1	0.2	0.1	--			
10MAR78	1607	-83	-89	-81	-91	-93	-99	-96	-110	63	66	15
		0.1	0.2	0.2	0.2	0.1	0.2	0.1	--			
13MAR78	1009	-91	-94	-89	-94	-96	-98	-98	-103	63	66	15
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			
13MAR78	1029	-89	-92	-88	-92	-94	-96	-97	-101	63	66	15
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3			
13MAR78	1051	-87	-90	-86	-90	-92	-93	-94	-96	63	66	15
		0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3			
13MAR78	1113	-87	-89	-85	-90	-92	-93	-94	-96	63	66	10
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
13MAR78	1412	-89	-95	--	--	--	--	--	--	63	63	10
		0.5	0.4	--	--	--	--	--	--			
13MAR78	1440	--	--	-88	-94	--	--	--	--	63	63	10
		--	--	0.4	0.4	--	--	--	--			
13MAR78	1455	--	--	--	--	-97	-109	--	--	63	63	10
		--	--	--	--	0.5	--	--	--			
13MAR78	1506	--	--	--	--	--	--	-103	-110	63	63	15
		--	--	--	--	--	--	--	--			
13MAR78	1515	-87	-91	-86	-91	-90	-92	-93	-94	63	66	15
		0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3			
13MAR78	1536	-88	-92	-87	-91	-91	-93	-93	-95	63	66	15
		0.3	0.4	0.3	0.3	0.2	0.3	0.2	0.3			
13MAR78	1556	-89	-94	-88	-93	-92	-96	-94	-98	63	66	15
		0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.3			
13MAR78	1615	-88	-92	-86	-91	-91	-94	-93	-96	63	66	15
		0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4			
14MAR78	843	-88	-90	-85	-90	-90	-88	-91	-90	63	66	15
		2.2	2.0	2.2	1.9	0.8	0.5	0.8	0.5			
14MAR78	902	-90	-92	-88	-92	-91	-92	-92	-93	63	66	15
		2.2	1.8	2.1	1.8	0.9	0.5	0.7	0.5			
14MAR78	928	-89	-90	-87	-90	-92	-91	-93	-91	63	66	15
		1.9	1.9	1.8	1.9	0.7	0.7	0.6	0.5			
14MAR78	1007	-87	-89	-85	-88	-89	-89	-91	-90	63	66	15
		1.9	1.5	1.8	1.4	0.8	0.6	0.7	0.7			
14MAR78	1458	-82	-88	-81	-88	-94	-98	-97	-99	63	66	15
		1.4	1.4	1.3	1.4	0.8	0.6	0.7	0.8			
14MAR78	1517	-86	-91	-85	-91	-94	-98	-98	-100	63	66	15
		1.4	1.4	1.3	1.4	0.7	0.7	0.6	0.8			
14MAR78	1545	-85	-91	-84	-91	-90	-95	-93	-99	63	66	15
		1.2	1.1	1.2	1.1	0.9	0.8	0.8	0.8			
14MAR78	1605	-90	-96	-88	-95	-91	-96	-93	-99	63	66	15
		1.0	0.9	1.0	0.9	0.9	0.9	0.8	0.8			
15MAR78	802	-97	-97	-94	-96	-96	-98	-98	-99	63	66	15
		0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3			
15MAR78	822	-96	-96	-92	-94	-94	-96	-97	-98	63	66	15
		0.5	0.4	0.5	0.4	0.5	0.4	0.4	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
15MAR78	855	-96	-95	-93	-94	-95	-96	-97	-98	63	66	15
		0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.4			
15MAR78	915	-95	-95	-92	-93	-94	-95	-96	-97	63	66	15
		0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.3			
16MAR78	822	-91	-95	-89	-94	-93	-95	-95	-96	63	66	15
		0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.3			
16MAR78	845	-92	-95	-89	-94	-93	-96	-96	-97	63	66	15
		0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.2			
16MAR78	931	-90	-96	-88	-96	-91	-96	-93	-98	63	66	15
		0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2			
16MAR78	953	--	-97	--	-96	--	-95	--	-97	63	66	10
		--	0.2	--	0.2	--	0.1	--	0.1			
16MAR78	1052	-89	--	--	--	-94	--	--	--	63	66	10
		0.2	--	--	--	0.1	--	--	--			
16MAR78	1102	--	-95	--	--	--	-98	--	--	63	63	10
		--	0.2	--	--	--	0.2	--	--			
16MAR78	1115	--	--	-88	--	--	--	-96	--	63	63	10
		--	--	0.1	--	--	--	0.1	--			
16MAR78	1127	--	--	--	-95	--	--	--	-102	63	63	10
		--	--	--	0.2	--	--	--	0.0			
16MAR78	1148	--	-95	-90	-95	--	--	--	--	63	63	10
		--	0.2	0.1	0.2	--	--	--	--			
16MAR78	1216	--	--	--	--	-96	-99	-98	-103	63	63	15
		--	--	--	--	0.1	0.2	0.1	0.2			
16MAR78	1453	-88	-92	-88	-92	-96	-98	-98	-103	63	66	15
		0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2			
16MAR78	1513	-88	-92	-88	-92	-94	-97	-97	-99	63	66	15
		0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
16MAR78	1532	-87	-92	-88	-93	-93	-97	-96	-100	63	66	15
		0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2			
16MAR78	1551	-88	-93	-89	-93	-93	-97	-95	-99	63	66	15
		0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2			
21MAR78	1001	-89	-86	-85	-86	-87	-85	-88	-87	63	66	15
		1.2	1.5	1.2	1.5	0.9	0.8	0.8	0.9			
21MAR78	1020	-87	-87	-83	-91	-85	-84	-86	-85	63	66	15
		1.4	1.5	1.4	0.9	0.9	0.8	0.7	0.9			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
21MAR78	1048	-86	-88	-81	-87	-86	-86	-88	-88	63	66	15
		1.6	1.4	1.7	1.3	0.7	0.4	0.8	0.6			
21MAR78	1108	-91	-91	-87	-90	-87	-87	-88	-88	63	66	15
		1.3	0.9	1.2	0.9	1.0	0.6	0.9	0.8			
21MAR78	1447	-94	-97	-91	-95	-91	-89	-93	-91	63	66	15
		1.1	1.5	1.0	1.3	0.5	0.6	0.4	0.6			
21MAR78	1503	-91	-92	-88	-90	-91	-87	-93	-90	63	66	15
		1.2	1.2	1.2	1.2	0.7	0.7	0.6	0.7			
21MAR78	1527	-90	-93	-86	-92	-89	-89	-91	-91	63	66	15
		1.3	0.9	1.2	0.9	0.8	0.4	0.8	0.6			
21MAR78	1545	-91	-94	-88	-93	-89	-90	-90	-91	63	66	15
		1.1	1.0	1.1	1.0	0.9	0.6	0.8	0.6			
22MAR78	830	-94	-99	-92	-99	-98	-100	-99	-102	63	66	15
		0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.2			
22MAR78	849	-96	-99	-92	-99	-100	-103	-102	-104	63	66	15
		0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4			
22MAR78	911	-97	-101	-93	-99	-102	-102	-104	-103	63	66	15
		0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4			
22MAR78	930	-99	-104	-94	-101	-102	-102	-104	-103	63	66	15
		0.8	0.9	0.5	0.7	0.5	0.5	0.4	0.4			
23MAR78	904	-88	-91	-86	-90	-93	-98	-93	-99	63	66	15
		0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4			
23MAR78	925	-89	-90	-86	-89	-94	-99	-97	-100	63	66	15
		0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4			
23MAR78	947	-87	-92	-84	-92	-93	-100	-97	-102	63	66	15
		0.4	0.3	0.3	0.4	0.3	0.4	0.3	0.5			
23MAR78	1007	-85	-91	-83	-91	-91	-99	-96	-103	63	66	15
		0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3			
23MAR78	1509	-84	-90	-85	-91	-102	-98	-99	-98	63	66	15
		0.7	0.8	0.7	0.7	0.9	0.7	0.7	0.7			
23MAR78	1532	-83	-91	-85	-92	-101	-101	-99	-99	63	66	15
		0.7	0.7	0.7	0.7	0.5	0.4	0.5	0.5			
23MAR78	1552	-86	-95	-87	-96	-110	-110	-108	-110	63	66	15
		0.4	0.5	0.4	0.4	--	--	0.4	--			
23MAR78	1611	-93	-106	-93	-102	-110	-110	-110	-110	63	66	15
		0.2	0.3	0.2	0.3	--	--	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
27MAR78	923	-80	-86	-78	-87	-87	-92	-91	-93	63	66	15
		0.9	0.8	0.9	0.9	0.6	0.4	0.5	0.5			
27MAR78	946	-80	-86	-78	-86	-90	-93	-93	-94	63	66	15
		0.7	0.7	0.7	0.7	0.6	0.4	0.6	0.6			
27MAR78	1020	-84	-87	-82	-88	-89	-90	-92	-91	63	66	15
		0.7	0.6	0.7	0.6	0.6	0.6	0.5	0.7			
27MAR78	1041	-85	-88	-84	-89	-89	-90	-92	-91	63	66	15
		0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.7			
27MAR78	1448	-88	-90	-87	-90	-85	-86	-88	-87	63	66	15
		0.3	0.2	0.3	0.2	0.3	0.2	0.2	0.3			
27MAR78	1508	-87	-90	-87	-89	-86	-86	-89	-88	63	66	15
		0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.3			
27MAR78	1528	-87	-90	-86	-89	-86	-86	-89	-88	63	66	15
		0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2			
27MAR78	1548	-87	-90	-86	-89	-86	-86	-89	-88	63	66	15
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			
28MAR78	905	-87	-93	-87	-94	-94	-92	-95	-94	63	66	15
		0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5			
28MAR78	945	-85	-89	-86	-90	-92	-89	-93	-90	63	66	15
		0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.5			
28MAR78	1012	-84	-89	-83	-91	-92	-92	-93	-93	63	66	15
		0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.4			
28MAR78	1032	-83	-89	-82	-91	-92	-93	-93	-94	63	66	15
		0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4			
28MAR78	1050	-86	-92	-86	-93	-94	-94	-95	-95	63	66	15
		0.3	0.5	0.3	0.4	0.2	0.4	0.2	0.4			
28MAR78	1110	-88	-93	-89	-94	-95	-95	-96	-96	63	66	15
		0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4			
28MAR78	1130	-84	-91	-86	-93	-94	-92	-95	-93	63	66	15
		0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4			
28MAR78	1150	-89	-89	-84	-91	-93	-91	-93	-92	63	66	15
		0.3	0.2	0.3	0.3	0.4	0.5	0.3	0.4			
28MAR78	1238	-91	-94	-92	-95	-94	-96	-96	-97	63	66	15
		0.3	0.5	0.3	0.4	0.3	0.4	0.4	0.3			
28MAR78	1258	-89	-92	-90	-95	-95	-94	-97	-96	63	66	15
		0.7	0.8	0.7	0.5	0.5	0.5	0.4	0.5			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
28MAR78	1317	-87	-92	-88	--	-92	-90	-93	-92	63	66	15
		0.7	0.7	0.7	--	0.5	0.4	0.5	0.5			
28MAR78	1337	-88	-93	-88	--	-90	-90	-91	-92	63	66	15
		0.4	0.5	0.4	--	0.5	0.3	0.4	0.4			
28MAR78	1356	-91	-96	-93	--	-93	-92	-94	-94	63	66	15
		0.6	0.7	0.6	--	0.5	0.4	0.5	0.4			
28MAR78	1418	-90	-93	-91	--	-93	-91	-94	-93	63	66	15
		0.6	0.5	0.6	--	0.5	0.5	0.5	0.4			
28MAR78	1436	-92	-97	-93	--	-92	-92	-93	-93	63	66	15
		0.4	0.4	0.4	--	0.6	0.4	0.5	0.5			
28MAR78	1445	-92	-97	-94	--	-93	-94	-94	-95	63	66	15
		0.4	0.5	0.4	--	0.3	0.3	0.3	0.3			
28MAR78	1516	-91	-97	-93	--	-93	-91	-95	-93	63	66	15
		0.3	0.3	0.3	--	0.4	0.3	0.4	0.4			
28MAR78	1535	-88	-91	-90	--	-90	-89	-90	-89	63	66	15
		0.2	0.2	0.2	--	0.5	0.5	0.5	0.6			
28MAR78	1555	-84	-88	-85	--	-90	-90	-91	-92	63	66	15
		0.3	0.3	0.3	--	0.3	0.2	0.3	0.3			
29MAR78	854	-91	-95	-89	--	-93	-96	-96	-96	63	66	15
		0.6	0.5	0.6	--	0.2	0.2	0.2	0.2			
29MAR78	913	-91	-96	-89	--	-95	-99	-99	-99	63	66	15
		0.7	0.6	0.6	--	0.4	0.3	0.4	0.2			
29MAR78	935	-93	-96	-91	--	-95	-97	-99	-98	63	66	15
		0.6	0.6	0.5	--	0.3	0.4	0.4	0.5			
29MAR78	956	-92	-95	-90	--	-94	-98	-98	-98	63	66	15
		0.7	0.7	0.6	--	0.4	0.4	0.4	0.3			
29MAR78	1017	-91	-95	-89	--	-93	-99	-96	-99	63	66	15
		0.6	0.6	0.6	--	0.5	0.5	0.5	0.6			
29MAR78	1035	-90	-95	-88	--	-93	-100	-96	-100	63	66	15
		0.6	0.7	0.6	--	0.5	0.6	0.6	0.5			
29MAR78	1054	-91	-96	-89	--	-95	-103	-99	-106	63	66	15
		0.7	0.7	0.6	--	0.5	0.5	0.5	0.7			
29MAR78	1116	-93	-97	-91	--	-96	-104	-100	-108	63	66	15
		0.8	0.8	0.7	--	0.6	0.5	0.7	0.6			
29MAR78	1135	-93	-98	-92	--	-96	-103	-101	-107	63	66	15
		0.7	0.6	0.7	--	0.5	0.6	0.5	0.6			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
29MAR78	1155	-97	-100	-94	--	-97	-104	-103	-106	63	66	15
		0.7	0.7	0.6	--	0.5	0.5	0.5	0.7			
29MAR78	1215	-96	-99	-94	--	-98	-103	-103	-108	63	66	15
		0.9	0.7	0.7	--	0.5	0.5	0.5	0.6			
29MAR78	1233	-95	-98	-93	--	-98	-104	-104	-108	63	66	15
		0.7	0.6	0.6	--	0.5	0.5	0.6	0.6			
29MAR78	1306	-94	-96	-92	--	-92	-94	-95	-95	63	66	15
		0.5	0.5	0.5	--	0.4	0.5	0.4	0.5			
29MAR78	1329	-94	-98	-92	--	-96	-103	-101	-107	63	66	15
		0.7	0.7	0.7	--	0.5	0.5	0.5	0.5			
29MAR78	1357	-94	-97	-92	--	-94	-101	-98	-103	63	66	15
		0.7	0.7	0.7	--	0.5	0.6	0.5	0.7			
29MAR78	1417	-94	-97	-92	--	-94	-99	-98	-100	63	66	15
		0.6	0.7	0.6	--	0.5	0.4	0.5	0.7			
29MAR78	1436	-94	-97	-93	--	-94	-99	-98	-99	63	66	15
		0.5	0.6	0.5	--	0.4	0.5	0.4	0.5			
29MAR78	1445	-77	-84	-78	--	-86	-95	-89	-96	63	66	15
		0.2	0.2	0.1	--	0.3	0.3	0.3	0.3			
29MAR78	1525	-94	-96	-93	--	-91	-93	-94	-93	63	66	15
		0.4	0.6	0.4	--	0.4	0.4	0.4	0.4			
29MAR78	1548	-95	-97	-93	--	-92	-94	-95	-95	63	66	15
		0.5	0.4	0.4	--	0.5	0.4	0.4	0.4			
29MAR78	1606	-95	-97	-93	--	-93	-97	-95	-97	63	66	15
		0.4	0.5	0.4	--	0.4	0.5	0.5	0.5			
30MAR78	909	-92	-95	-91	--	-92	-96	-93	-96	63	66	15
		0.3	0.3	0.3	--	0.4	0.3	0.4	0.3			
30MAR78	932	-90	-94	-90	--	-94	-100	-96	-100	63	66	15
		0.3	0.5	0.4	--	0.3	0.3	0.3	0.2			
30MAR78	955	-89	-92	-89	--	-94	-99	-97	-100	63	66	15
		0.3	0.4	0.4	--	0.3	0.4	0.2	0.4			
30MAR78	1018	-87	-90	-87	--	-92	-95	-95	-98	63	66	15
		0.4	0.4	0.3	--	0.3	0.4	0.4	0.4			
30MAR78	1050	-82	-89	-83	--	-85	-91	-87	-92	63	66	15
		0.3	0.3	0.3	--	0.3	0.3	0.3	0.3			
30MAR78	1109	-84	-92	-85	--	-87	-94	-89	-96	63	66	15
		0.4	0.4	0.3	--	0.3	0.3	0.3	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
30MAR78	1129	-85	-91	-86	--	-90	-98	-92	-98	63	66	15
		0.4	0.4	0.4	--	0.3	0.4	0.3	0.4			
30MAR78	1157	-84	-88	-85	--	-93	-98	-95	-98	63	66	15
		0.4	0.4	0.4	--	0.3	0.4	0.3	0.4			
30MAR78	1228	-84	-89	-85	--	-90	-94	-92	-96	63	66	15
		0.4	0.4	0.4	--	0.4	0.5	0.4	0.5			
30MAR78	1335	-79	-87	-81	--	-89	-97	-92	-98	63	66	15
		0.3	0.3	0.3	--	0.2	0.3	0.2	0.3			
30MAR78	1356	-79	-87	-80	--	-89	-97	-92	-98	63	66	15
		0.2	0.2	0.2	--	0.2	0.2	0.2	0.2			
30MAR78	1418	-79	-88	-80	--	-88	-97	-91	-98	63	66	15
		0.2	0.2	0.2	--	0.3	0.3	0.2	0.2			
30MAR78	1438	-81	-91	-82	--	-89	-98	-91	-99	63	66	15
		0.2	0.3	0.3	--	0.2	0.2	0.2	0.3			
30MAR78	1509	-79	-86	-80	--	-92	-101	-94	-100	63	66	15
		0.2	0.2	0.2	--	0.2	0.3	0.2	0.2			
30MAR78	1535	-81	-90	-82	--	-90	-100	-92	-101	63	66	15
		0.3	0.2	0.3	--	0.2	0.3	0.2	0.3			
31MAR78	829	-83	-90	-83	--	-95	-104	-97	-103	63	66	15
		0.4	0.3	0.4	--	0.3	0.6	0.4	0.6			
31MAR78	916	-83	-92	-93	--	-99	-110	-100	-108	63	66	15
		0.3	0.3	0.3	--	0.2	--	0.3	0.5			
31MAR78	943	-82	-92	-82	--	-99	-110	-100	-107	63	66	15
		0.2	0.2	0.3	--	0.2	--	0.3	0.6			
31MAR78	1008	-83	-90	-83	--	-97	-106	-99	-105	63	66	15
		0.3	0.3	0.4	--	0.3	0.4	0.3	0.5			
4MAY78	955	-80	-83	-82	-85	-92	-93	-95	-94	63	66	15
		0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2			
4MAY78	1036	-79	-82	-80	-84	-92	-93	-94	-94	63	66	15
		0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2			
4MAY78	1051	-79	-82	-79	-84	-92	-93	-94	-95	63	66	15
		0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2			
4MAY78	1130	-84	-84	-86	-88	--	-92	-98	-93	63	66	15
		0.2	0.2	0.2	0.2	--	0.1	0.1	0.1			
4MAY78	1153	-82	-85	-85	-87	-94	-91	-97	-92	63	66	15
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
4MAY78	1220	-84	-87	-87	-90	-94	-92	-98	-93	63	66	15
		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			
4MAY78	1300	-81	-85	-82	-87	-88	-88	-90	-89	63	66	15
		0.5	0.5	0.4	0.5	0.5	0.6	0.5	0.5			
8MAY78	1356	-90	-92	-90	-99	-96	-97	-97	-98	63	66	15
		0.8	0.7	0.8	1.0	0.7	0.6	0.6	0.7			
8MAY78	1416	-92	-93	-92	-96	-102	-101	-102	-103	63	66	15
		1.6	1.4	1.4	1.5	0.8	0.7	0.8	0.9			
8MAY78	1452	-92	-94	-92	-96	-97	-97	-98	-99	63	66	10
		1.4	1.5	1.4	1.6	0.9	0.7	0.8	0.9			
12MAY78	906	-87	-88	-88	-91	--	--	--	--	63	66	20
		1.0	1.0	0.9	1.0	--	--	--	--			
12MAY78	926	-88	-89	-88	-92	--	--	--	--	63	66	10
		1.1	1.1	1.0	1.0	--	--	--	--			
12MAY78	950	-88	-91	-89	-93	--	--	--	--	63	66	10
		1.0	0.9	0.9	0.8	--	--	--	--			
12MAY78	1001	-88	-89	-88	-92	--	--	--	--	63	66	10
		0.9	1.0	0.8	0.9	--	--	--	--			
12MAY78	1020	-92	-94	-93	-96	--	--	--	--	63	66	10
		1.0	1.1	0.9	1.1	--	--	--	--			
12MAY78	1102	-92	-94	-92	-96	--	--	--	--	63	66	15
		1.0	1.2	1.0	1.2	--	--	--	--			
12MAY78	1306	-89	--	-89	--	-90	--	-91	--	66	66	10
		1.3	--	1.2	--	0.6	--	0.6	--			
12MAY78	1325	-90	--	-90	--	-90	--	-92	--	66	66	10
		1.3	--	1.2	--	0.6	--	0.5	--			
12MAY78	1338	-89	--	-89	--	-93	--	-94	--	66	66	10
		1.3	--	1.2	--	0.7	--	0.7	--			
12MAY78	1350	-88	--	-88	--	-96	--	-97	--	66	66	10
		1.4	--	1.5	--	0.8	--	0.6	--			
12MAY78	1402	-85	--	-85	--	-95	--	-95	--	66	66	4
		1.6	--	1.6	--	0.9	--	0.8	--			
12MAY78	1412	-85	--	-85	--	-95	--	-96	--	66	66	4
		1.6	--	1.5	--	0.9	--	0.9	--			
12MAY78	1418	-84	--	-85	--	-95	--	-95	--	66	66	15
		1.5	--	1.5	--	1.0	--	0.7	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
12MAY78	1434	-83	--	-84	--	-92	--	-92	--	66	66	10
		1.6	--	1.4	--	0.7	--	0.5	--			
16MAY78	953	-86	-86	-85	-88	-88	-88	-91	-92	63	66	20
		0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5			
16MAY78	1024	-84	-87	-84	-88	--	-88	--	-90	63	66	10
		0.3	0.4	0.4	0.4	--	0.5	--	0.5			
16MAY78	1118	-87	-87	-86	-89	-89	-91	-92	-91	63	66	10
		0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4			
16MAY78	1138	-87	-87	-86	-88	-91	-90	-93	-90	63	66	10
		0.4	0.5	0.4	0.5	0.4	0.4	0.3	0.4			
16MAY78	1158	-87	-88	-86	-89	-90	-88	-92	-88	63	66	10
		0.4	0.5	0.4	0.5	0.4	0.4	0.3	0.4			
16MAY78	1225	-89	-89	-88	-90	-92	-90	-92	-89	63	66	10
		0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.4			
16MAY78	1245	-88	-89	-88	-91	-90	-90	-92	-90	63	66	10
		0.3	0.2	0.3	0.3	0.4	0.4	0.3	0.4			
16MAY78	1310	-88	-89	-87	-91	-89	-89	-91	-89	63	66	10
		0.2	0.3	0.2	0.2	0.4	0.4	0.4	0.4			
16MAY78	1320	-86	--	-87	--	-89	--	-90	--	63	66	10
		0.3	--	0.3	--	0.7	--	0.6	--			
16MAY78	1342	-86	--	-87	--	-91	--	-91	--	63	66	10
		0.3	--	0.3	--	0.5	--	0.4	--			
16MAY78	1408	-88	-89	-87	-91	-88	-91	-89	-90	63	66	10
		0.3	0.3	0.3	0.4	0.5	0.4	0.4	0.5			
16MAY78	1420	-88	-88	-87	-90	-89	-90	-90	-90	63	66	10
		0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4			
16MAY78	1430	-85	-86	-84	-88	-93	-92	-92	-92	63	66	10
		1.6	1.6	1.6	1.6	0.6	0.5	0.5	0.5			
16MAY78	1440	-88	-88	-88	-90	-92	-91	-92	-92	63	66	10
		0.7	0.8	0.8	0.8	0.5	0.4	0.4	0.5			
16MAY78	1452	-90	-90	-90	-92	-89	-89	-89	-89	63	66	10
		0.3	0.4	0.2	0.4	0.5	0.5	0.5	0.5			
16MAY78	1505	-89	-89	-89	-91	-88	-89	-89	-89	63	66	10
		0.3	0.4	0.3	0.3	0.5	0.5	0.5	0.5			
17MAY78	1002	-88	-89	-86	-90	-94	-93	-94	-93	63	66	10
		0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.3			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
17MAY78	1014	-88	-89	-87	-91	-94	-92	-94	-93	63	66	4
		0.5	0.6	0.5	0.6	0.4	0.4	0.4	0.4			
17MAY78	1025	-89	-90	-89	-89	-94	--	-94	--	63	66	10
		--	0.3	--	0.6	0.4	--	0.4	--			
17MAY78	1032	-90	-90	-89	-91	-93	--	--	--	63	66	10
		0.6	0.7	0.6	0.6	0.5	--	--	--			
17MAY78	1043	-90	-90	-89	-90	-94	-90	-93	-89	63	66	10
		0.6	0.6	0.5	0.6	0.5	0.4	0.4	0.4			
17MAY78	1055	-89	-90	-88	-91	--	--	--	--	63	66	4
		0.4	0.5	0.5	0.6	--	--	--	--			
17MAY78	1101	-90	-91	-89	-91	-94	-90	-94	-89	63	66	4
		0.5	0.6	0.4	0.6	0.4	0.5	0.3	0.4			
17MAY78	1109	-91	-91	-90	-92	-95	-92	-94	-91	63	66	10
		0.5	0.6	0.5	0.5	0.5	0.4	0.3	0.4			
17MAY78	1135	-89	-92	-88	-92	-91	-92	-90	-92	63	66	10
		0.4	0.5	0.4	0.4	0.6	0.5	0.6	0.5			
17MAY78	1300	-91	-92	-89	-93	-93	-93	-92	-92	63	66	10
		0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4			
17MAY78	1315	-91	-92	-89	-93	-96	-94	-95	-93	63	66	4
		0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.3			
17MAY78	1331	-91	-92	-88	-91	-97	-95	-96	-94	63	66	2
		0.3	0.4	--	0.4	0.5	0.5	0.4	0.5			
17MAY78	1345	-91	-92	-89	-91	-95	-93	-95	-92	63	66	10
		0.5	0.4	--	0.4	0.5	0.5	0.7	0.6			
17MAY78	1355	-89	-92	-88	-93	-95	-93	-94	-94	63	66	4
		0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.5			
17MAY78	1410	-90	-93	-89	-94	-94	-94	-94	-93	63	66	10
		0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3			
17MAY78	1420	-91	-94	-90	-95	-94	-93	-93	-93	63	66	10
		0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3			
17MAY78	1440	-91	-94	-90	-95	-94	-94	-94	-93	63	66	10
		0.4	0.3	0.2	0.3	0.3	0.4	0.3	0.3			
18MAY78	917	-81	-80	-80	-82	-86	-83	-87	-84	63	66	20
		0.7	0.9	0.7	0.9	0.6	0.6	0.5	0.6			
18MAY78	928	-78	-80	-79	-81	-84	-83	-85	-83	63	66	20
		0.9	1.0	0.9	1.0	0.7	0.5	0.6	0.6			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
18MAY78	951	-80	-82	-80	-83	-88	-86	-88	-86	63	66	20
		0.7	0.6	0.6	0.7	0.4	0.4	0.4	0.5			
18MAY78	1016	-82	-84	-82	-86	-89	-88	-90	-89	63	66	20
		0.6	0.6	0.5	0.6	0.4	0.5	0.4	0.5			
18MAY78	1048	-81	-84	-81	-85	-84	-83	-84	-86	63	66	20
		0.7	0.7	0.6	0.7	0.7	0.5	0.6	0.6			
18MAY78	1115	-81	-84	-81	-86	-82	-82	-81	-83	63	66	20
		0.6	0.6	0.6	0.7	0.8	0.6	0.7	0.7			
18MAY78	1145	-83	-85	-82	-87	-84	-84	-83	-84	63	66	20
		0.8	0.5	0.5	0.5	0.6	0.5	0.6	0.6			
18MAY78	1209	-85	-88	-85	-90	-89	-88	-87	-89	63	66	20
		0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4			
18MAY78	1300	-86	-87	-85	-89	-93	-90	-89	-91	63	66	20
		0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4			
18MAY78	1322	-86	-88	-86	-90	-95	-89	-89	-90	63	66	15
		0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4			
18MAY78	1350	-86	-90	-86	-91	-90	-93	-91	-94	63	66	15
		0.4	0.4	0.4	0.3	0.2	0.3	0.3	0.2			
18MAY78	1415	-84	-87	-84	-89	-90	-94	-91	-94	63	66	15
		0.4	0.5	0.4	0.5	0.3	0.3	0.2	0.3			
18MAY78	1507	-87	-88	-87	-90	-90	-93	-92	-93	63	66	15
		0.5	0.6	0.5	0.6	0.4	0.4	0.4	0.4			
18MAY78	1526	-87	-88	-87	-89	-90	-93	-91	-93	63	66	10
		0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5			
18MAY78	1549	-87	-89	-87	-91	-87	-90	-89	-91	63	66	10
		0.5	0.6	0.5	0.5	0.7	0.7	0.6	0.7			
18MAY78	1604	-86	-87	-86	-89	-85	-87	-86	-88	63	66	10
		0.9	1.0	0.9	0.9	0.9	0.7	0.8	0.8			
19MAY78	927	-77	-81	-76	-82	-83	-86	-85	-87	63	63	20
		0.6	0.6	0.6	0.6	0.4	0.5	0.5	0.6			
19MAY78	940	-78	-82	-78	-84	-84	-86	-86	-88	63	63	10
		0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.6			
19MAY78	1004	-79	-83	-79	-84	-85	-86	-86	-87	63	63	10
		0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.7			
19MAY78	1017	-79	-83	-79	-85	-85	-82	-85	-84	63	63	10
		0.5	0.7	0.5	0.7	0.7	0.8	0.7	0.8			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM): PA1	PA2	TEST LENGTH (MIN)
19MAY78	1041	-80	-82	-80	-84	-85	-84	-86	-85	63	63	10
		0.5	0.7	0.6	0.7	0.7	0.7	0.7	0.8			
19MAY78	1053	-80	-81	-80	-83	-85	-84	-85	-85	63	63	10
		0.7	0.8	0.6	0.8	0.6	0.7	0.6	0.7			
19MAY78	1107	-78	-80	-79	-82	-83	-82	-83	-83	63	63	10
		0.7	0.8	0.7	0.8	0.7	0.6	0.7	0.7			
19MAY78	1119	-78	-80	-78	-81	-81	-81	-81	-82	63	63	10
		0.7	0.8	0.7	0.8	0.6	0.7	0.6	0.7			
19MAY78	1132	-76	-79	-76	-80	-82	-81	-81	-82	63	63	10
		0.9	0.9	0.8	0.7	0.5	0.6	0.5	0.7			
19MAY78	1145	-76	-79	-75	-81	-82	-81	-81	-81	63	63	10
		0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.8			
19MAY78	1158	-77	-81	-77	-82	-83	-81	-82	-82	63	63	20
		0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.8			
19MAY78	1300	-85	-84	-85	-86	-83	-81	-82	-82	63	63	20
		0.6	1.2	0.6	1.1	0.9	0.7	0.8	0.8			
19MAY78	1327	-85	-86	-85	-87	-83	-81	-82	-82	63	63	20
		0.9	1.2	0.9	1.1	0.9	0.7	0.8	0.7			
19MAY78	1352	-87	-90	-87	-91	-83	-82	-82	-83	63	63	20
		0.8	1.0	0.9	1.0	0.9	0.6	0.8	0.7			
19MAY78	1417	-87	-90	-87	-91	-89	-87	-87	-88	63	63	20
		0.9	1.1	0.9	1.0	0.6	0.5	0.6	0.5			
19MAY78	1450	-84	-86	-84	-88	-90	-90	-89	-91	63	63	15
		1.1	1.1	1.0	1.0	0.8	0.5	0.8	0.6			
22MAY78	1151	-91	-91	-85	-93	--	--	--	--	63	63	10
		0.6	0.7	0.5	0.6	--	--	--	--			
22MAY78	1253	-92	-94	-90	-96	--	--	--	--	63	63	10
		0.8	0.9	0.8	0.8	--	--	--	--			
22MAY78	1306	-93	-94	-92	-97	--	--	--	--	63	63	4
		0.7	0.9	0.7	0.8	--	--	--	--			
22MAY78	1320	-94	-95	-93	-97	--	--	--	--	63	63	4
		0.7	0.9	0.7	0.8	--	--	--	--			
22MAY78	1327	-94	-95	-92	-97	--	--	--	--	63	63	4
		0.8	0.9	0.8	0.8	--	--	--	--			
22MAY78	1340	-93	-95	-91	-97	--	--	--	--	63	63	4
		0.8	0.8	0.8	0.7	--	--	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
22MAY78	1405	-90	-91	-87	-93	--	--	--	--	63	63	10
		0.7	0.9	0.7	0.8	--	--	--	--			
22MAY78	1412	-89	-91	-87	-93	--	--	--	--	63	63	10
		0.9	0.8	0.8	0.7	--	--	--	--			
22MAY78	1423	-90	-92	-88	-94	--	--	--	--	63	63	10
		0.7	0.9	0.8	0.8	--	--	--	--			
22MAY78	1437	-88	-93	-86	-94	--	--	--	--	63	63	10
		0.7	0.7	0.8	0.7	--	--	--	--			
22MAY78	1447	-87	-92	-84	-94	--	--	--	--	63	63	10
		0.7	0.7	0.6	0.7	--	--	--	--			
22MAY78	1501	-88	-92	-86	-94	--	--	--	--	63	63	10
		0.6	0.6	0.6	0.7	--	--	--	--			
22MAY78	1514	-90	-94	-88	-96	--	--	--	--	63	63	10
		0.7	0.7	0.7	0.7	--	--	--	--			
22MAY78	1523	-91	-94	-89	-96	--	--	--	--	63	63	10
		0.8	0.7	0.8	0.7	--	--	--	--			
22MAY78	1535	-92	-96	-91	-98	--	--	--	--	63	63	10
		0.8	0.9	0.9	0.8	--	--	--	--			
23MAY78	945	-83	-85	-82	-87	--	--	--	--	63	63	10
		0.5	0.5	0.6	0.5	--	--	--	--			
23MAY78	1000	-87	-88	-85	-90	--	--	--	--	63	63	10
		0.6	0.5	0.6	0.5	--	--	--	--			
23MAY78	1013	-88	-89	-87	-91	--	--	--	--	63	63	10
		0.6	0.6	0.6	0.6	--	--	--	--			
23MAY78	1025	-89	-90	-87	-91	--	--	--	--	63	63	4
		0.7	0.7	0.6	0.7	--	--	--	--			
23MAY78	1046	-88	-89	-87	-90	--	--	--	--	63	63	10
		0.8	0.7	0.6	0.7	--	--	--	--			
23MAY78	1103	-89	-88	-87	-89	--	--	--	--	63	63	10
		0.7	0.7	0.6	0.6	--	--	--	--			
23MAY78	1116	-89	-88	-88	-89	--	--	--	--	63	63	10
		0.7	0.8	0.6	0.7	--	--	--	--			
23MAY78	1127	-89	-89	-88	-90	--	--	--	--	63	63	10
		0.6	0.7	0.7	0.6	--	--	--	--			
23MAY78	1142	-89	-90	-88	-91	--	--	--	--	63	63	10
		0.7	0.7	0.7	0.8	--	--	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
23MAY78	1154	-88	-89	-87	-91	--	--	--	--	63	63	10
		0.9	0.8	0.8	0.8	--	--	--	--			
23MAY78	1237	-82	-83	-81	-85	--	--	--	--	63	63	10
		1.3	1.3	1.3	1.3	--	--	--	--			
23MAY78	1251	-79	-80	-78	-82	--	--	--	--	63	63	20
		1.3	1.3	1.3	1.4	--	--	--	--			
23MAY78	1308	-82	-83	-80	-85	--	--	--	--	63	63	20
		1.2	1.3	1.2	1.2	--	--	--	--			
23MAY78	1328	-83	-85	-81	-86	--	--	--	--	63	63	20
		0.9	1.0	0.8	1.0	--	--	--	--			
23MAY78	1353	-85	-84	-82	-85	--	--	--	--	63	63	20
		0.8	1.0	0.7	1.0	--	--	--	--			
23MAY78	1417	-87	-87	-84	-87	--	--	--	--	63	63	10
		0.9	1.1	0.9	1.1	--	--	--	--			
23MAY78	1436	-87	-86	-84	-86	--	--	--	--	63	63	10
		1.0	1.0	0.9	1.0	--	--	--	--			
23MAY78	1449	-87	-84	-83	-84	--	--	--	--	63	63	20
		0.9	1.1	0.9	1.0	--	--	--	--			
23MAY78	1502	-86	-85	-83	-86	--	--	--	--	63	63	20
		0.8	0.9	0.8	0.8	--	--	--	--			
24MAY78	1206	-78	-82	-76	-82	--	-85	-85	-85	63	63	20
		0.3	0.2	0.3	0.2	--	0.2	0.2	0.2			
24MAY78	1230	-79	-83	-77	-82	--	-84	-85	-84	63	63	20
		0.3	0.3	0.3	0.2	--	0.3	0.2	0.3			
24MAY78	1256	-79	-83	-76	-83	--	-85	-85	-84	63	63	20
		0.5	0.4	0.4	0.4	--	0.1	0.3	0.3			
24MAY78	1318	-78	-83	-75	-83	--	-84	-84	-84	63	63	20
		0.5	0.4	0.5	0.4	--	0.4	0.4	0.4			
24MAY78	1339	-79	-85	-77	-84	--	-84	-83	-84	63	63	20
		0.5	0.4	0.5	0.4	--	0.4	0.4	0.4			
24MAY78	1410	-83	-88	-82	-87	--	-86	--	-86	63	63	20
		0.5	0.5	0.5	0.5	--	0.5	--	0.5			
24MAY78	1433	-83	-87	-81	-87	--	-86	--	-87	63	63	4
		0.5	0.4	0.5	0.4	--	0.4	--	0.4			
25MAY78	1203	-91	-90	-89	-91	--	--	--	--	63	63	2
		0.9	0.9	0.8	0.8	--	--	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
25MAY78	1210	-90	-90	-88	-90	--	--	--	--	63	63	2
		0.6	0.6	0.6	0.6	--	--	--	--			
25MAY78	1215	-92	-90	-89	-90	--	--	--	--	63	63	2
		0.7	0.9	0.8	0.8	--	--	--	--			
25MAY78	1220	-90	-88	-87	-88	--	--	--	--	63	63	2
		0.9	1.2	0.8	1.1	--	--	--	--			
25MAY78	1225	-89	-89	-87	-89	--	--	--	--	63	63	2
		0.8	1.2	0.9	0.9	--	--	--	--			
25MAY78	1230	-87	-86	-85	-87	--	--	--	--	63	63	2
		0.8	0.8	0.9	0.9	--	--	--	--			
25MAY78	1235	-88	-88	-86	-88	--	--	--	--	63	63	15
		0.7	0.8	0.8	0.8	--	--	--	--			
29NOV78	1010	-91	-95	-93	-95	-96	-93	-104	-91	63	63	15
		0.4	0.4	0.4	0.5	0.4	0.4	--	0.3			
29NOV78	1030	-95	-97	-97	-98	-107	-99	-109	-96	63	63	15
		0.6	0.7	0.6	0.6	0.9	0.9	0.3	0.8			
29NOV78	1441	-101	-104	-103	-104	-110	-107	-110	-104	63	63	15
		1.6	1.5	1.4	1.4	--	1.0	--	1.2			
29NOV78	1501	-101	-102	-103	-102	-110	-108	-110	-104	63	63	15
		1.4	1.2	1.1	0.9	--	--	--	1.0			
30NOV78	935	-95	-92	-95	-92	-108	-106	-110	-110	63	63	15
		0.8	0.7	0.8	0.7	0.5	1.1	--	0.1			
30NOV78	1041	-95	-94	-96	-93	-108	-108	-108	-110	63	63	15
		0.5	0.5	0.5	0.5	0.6	0.5	1.0	--			
30NOV78	1250	--	-95	--	-95	--	--	--	--	63	63	15
		--	1.4	--	1.4	--	--	--	--			
4DEC78	1020	-82	-85	-85	-85	-84	-79	--	-79	63	63	15
		2.1	2.0	1.9	1.9	1.9	2.2	--	2.1			
4DEC78	1052	-86	-86	-88	-87	-83	-79	--	-80	63	63	15
		1.9	2.1	2.0	2.0	2.2	2.2	--	2.2			
4DEC78	1258	-94	-97	-96	-96	-104	-97	-109	-95	63	63	15
		1.2	1.3	1.2	1.2	1.7	1.8	--	1.7			
4DEC78	1410	-87	-92	-90	-90	-106	-102	-109	-101	63	63	15
		1.6	1.8	1.6	1.7	1.0	1.6	--	1.3			
5DEC78	942	-92	-90	-94	-91	-107	-99	--	-98	63	63	15
		0.4	0.5	0.4	0.5	0.9	0.6	--	0.6			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM): PA1	PA2	TEST LENGTH (MIN)
5DEC78	1037	-90	-88	-92	-88	-101	-95	--	-93	63	63	15
		0.7	0.8	0.7	0.8	0.8	0.7	--	0.6			
5DEC78	1253	-91	-89	-92	-90	-97	-93	--	-92	63	63	15
		0.5	0.5	0.4	0.5	0.6	0.6	--	0.5			
5DEC78	1446	-92	-91	-95	-92	-97	-94	--	-91	63	63	15
		0.6	0.5	0.5	0.5	0.5	0.6	--	0.6			
6DEC78	1135	-85	-90	-85	-89	-97	-96	-93	-94	63	63	15
		0.2	0.2	0.2	0.2	0.3	0.4	0.2	0.3			
6DEC78	1219	-86	-91	-87	-92	-98	-97	-93	-93	63	63	15
		0.2	0.4	0.2	0.3	0.4	0.5	0.3	0.4			
7DEC78	1041	-90	-92	-93	-93	-93	-90	-89	-88	63	63	15
		0.8	0.9	0.8	0.9	0.8	0.8	0.7	0.7			
7DEC78	1300	-95	-97	-97	-98	-97	-92	-94	-92	63	63	15
		1.1	1.2	1.0	1.0	0.9	0.9	0.7	0.9			
7DEC78	1455	-96	-101	-98	-99	-110	-110	-110	-101	63	63	15
		1.0	1.1	0.9	1.0	--	--	--	0.6			
11DEC78	930	-85	-86	-87	-87	-92	--	-91	-88	63	63	15
		0.3	0.3	0.3	0.3	0.3	--	0.2	0.2			
11DEC78	1033	-83	-85	-85	-85	-88	--	-87	-86	63	63	15
		0.4	0.4	0.4	0.4	0.4	--	0.4	0.4			
11DEC78	1403	-93	-98	-95	-101	--	--	--	--	63	63	15
		0.3	0.4	0.3	0.6	--	--	--	--			
11DEC78	1440	-94	-98	-96	-99	--	--	--	--	63	63	15
		0.3	0.4	0.3	0.4	--	--	--	--			
12DEC78	1032	-92	-95	-95	-95	-96	-93	--	-93	63	63	15
		0.3	0.3	0.3	0.4	0.5	0.7	--	0.5			
12DEC78	1052	-90	-94	-91	-93	-98	-94	--	-95	63	63	15
		0.5	0.5	0.5	0.6	0.5	0.5	--	0.5			
13DEC78	1025	-89	-95	-90	-93	-109	-101	-110	-99	63	63	15
		0.7	0.8	0.6	0.7	--	1.0	--	0.9			
13DEC78	1116	-99	-103	-97	-99	-109	-97	-110	-97	63	63	15
		0.7	0.7	0.6	0.5	--	1.5	--	1.3			
13DEC78	1232	-91	-97	-92	-93	-110	-101	-110	-100	63	63	15
		0.8	0.9	0.8	0.8	--	1.2	--	1.2			
13DEC78	1407	-92	-98	-93	-93	-110	-106	-110	-109	63	63	15
		1.8	1.3	1.1	1.1	--	1.1	--	--			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
18DEC78	1115	--	-93	-94	-94	-99	-99	-95	-94	63	63	15
		--	1.3	1.2	1.3	0.8	1.0	0.9	0.9			
18DEC78	1247	--	-89	-90	-90	-104	-101	-98	-97	63	63	15
		--	1.8	1.3	1.5	1.3	1.4	1.4	1.2			
2JAN79	1033	-103	-105	-104	-103	-105	-94	-104	-94	63	63	15
		0.9	1.4	0.8	1.3	1.9	1.9	1.4	1.6			
2JAN79	1105	-103	-103	-104	-101	-106	-94	-105	-94	63	63	15
		1.5	1.6	1.4	1.8	1.8	2.1	1.1	1.9			
2JAN79	1231	-96	-101	-97	-98	-99	-90	-100	-90	63	63	15
		1.1	1.4	0.8	1.1	2.0	2.1	1.8	2.0			
2JAN79	1334	-98	-103	-98	-99	-104	-93	-104	-93	63	63	15
		0.8	1.1	0.7	0.8	2.2	2.2	1.9	2.2			
3JAN79	1115	-104	-101	-104	-105	--	-99	--	-99	63	63	15
		0.9	0.7	0.8	0.8	--	0.3	--	0.9			
3JAN79	1150	-110	-101	-106	-105	--	-99	--	--	63	63	15
		0.9	0.8	0.9	1.0	--	0.5	--	--			
3JAN79	1305	-110	-100	-102	-103	--	-100	--	--	63	63	15
		0.1	0.5	0.5	0.5	--	0.3	--	--			
3JAN79	1440	-103	-99	-99	-101	--	-100	--	--	63	63	15
		0.5	0.4	0.4	0.5	--	0.2	--	--			
15JAN79	1053	-101	-100	-98	-98	-103	-99	-101	-97	63	63	15
		0.5	0.5	0.5	0.5	0.5	0.7	0.5	0.7			
15JAN79	1120	-106	-101	-100	-99	-102	-97	-100	-95	63	63	15
		0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6			
15JAN79	1230	-100	-97	-97	-94	--	-97	-95	-94	63	63	15
		0.5	0.6	0.4	0.6	--	0.6	0.3	0.5			
15JAN79	1335	-103	-98	-98	-95	-93	-98	-97	-95	63	63	15
		0.4	0.3	0.3	0.3	0.3	0.5	0.3	0.5			
16JAN79	931	-100	-102	-96	-97	-99	-96	--	-94	63	63	15
		0.5	0.5	0.4	0.4	0.4	0.5	--	0.4			
16JAN79	1012	-105	-100	-94	-95	-97	-95	--	-93	63	63	15
		0.3	0.4	0.3	0.4	0.3	0.4	--	0.3			
16JAN79	1226	-93	-98	-89	-91	-98	-98	--	-96	63	63	15
		0.4	0.4	0.3	0.4	0.3	0.3	--	0.3			
16JAN79	1414	-88	-95	-85	-88	-104	-104	--	-103	63	63	15
		0.2	0.3	0.2	0.3	0.3	0.4	--	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
17JAN79	934	-103	-103	-104	-101	-106	-101	-102	--	63	63	15
		1.6	2.1	1.5	1.6	1.2	1.2	1.2	--			
17JAN79	1040	-98	-94	-97	-93	-102	-96	-98	--	63	63	15
		1.5	1.6	1.5	1.4	1.5	1.5	1.1	--			
23JAN79	925	-89	-84	-88	-90	-93	-96	-98	-95	63	63	15
		0.2	0.2	0.2	0.2	0.3	0.6	0.4	0.5			
23JAN79	1028	-87	-79	-84	-85	-89	-92	-94	-91	63	63	15
		0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6			
23JAN79	1258	-99	-92	-95	-99	-93	-107	-99	-106	63	63	15
		0.3	0.4	0.3	0.5	--	0.7	--	0.6			
23JAN79	1450	-92	-87	-90	-92	-93	-98	-98	-96	63	63	15
		0.3	0.4	0.3	0.4	0.1	1.1	0.2	0.9			
24JAN79	1017	-103	-99	-100	-104	-99	-98	-98	-96	63	63	15
		1.6	1.4	1.3	1.1	1.3	1.2	1.2	1.3			
24JAN79	1100	-100	-97	-97	-99	-98	-99	-95	-98	63	63	15
		2.0	2.0	1.6	0.9	0.2	1.6	0.2	1.2			
24JAN79	1205	-101	-97	-98	-100	-98	-98	-95	-96	63	63	15
		2.2	2.2	1.7	1.1	0.5	1.9	0.3	1.9			
24JAN79	1502	-100	-96	-97	-103	-95	-94	-94	-93	63	63	15
		1.9	1.8	1.5	0.6	1.4	2.0	0.5	1.8			
26JAN79	930	-101	-102	-101	-101	-99	-98	--	-96	63	63	15
		1.1	1.2	1.0	1.0	1.0	1.1	--	1.0			
26JAN79	1038	-103	-102	-103	--	-103	-103	--	-100	63	63	15
		1.2	1.3	1.2	--	1.4	1.4	--	1.3			
26JAN79	1235	-97	-99	-98	--	-103	-101	--	-99	63	63	15
		0.9	1.3	1.0	--	1.2	1.1	--	1.1			
26JAN79	1432	-104	-103	--	-102	-101	-100	--	-98	63	63	15
		1.2	1.4	--	0.8	1.2	1.2	--	1.1			
15FEB79	910	-93	-93	-93	-92	-97	-96	-97	-91	63	63	15
		0.3	0.4	0.3	0.4	0.3	0.5	0.3	0.4			
15FEB79	1017	-90	-90	-90	-89	-100	-96	-101	-96	63	63	15
		0.3	0.4	0.3	0.4	0.4	0.5	0.5	0.4			
2APR79	1020	-100	-92	-96	-94	-93	-88	-92	-85	63	63	15
		2.1	2.0	2.1	2.0	1.8	1.9	1.9	1.8			
2APR79	1133	-102	-93	-97	-95	-94	-90	-94	-87	63	63	15
		2.2	1.8	1.9	1.6	1.9	1.9	1.8	1.8			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
2APR79	1233	-103	-95	-98	-95	-97	-91	-96	-89	63	63	15
		2.2	2.1	2.0	2.0	2.1	1.9	2.1	1.7			
2APR79	1330	-104	-97	-100	-99	-99	-93	-98	-90	63	63	15
		2.2	2.0	2.1	1.8	1.6	1.4	1.7	1.5			
5APR79	923	-97	-97	-99	-99	-98	-98	--	-96	63	63	15
		0.6	0.6	0.6	0.6	0.7	0.7	--	0.7			
10APR79	916	-88	--	-88	--	-97	--	-95	--	63	63	15
		0.6	--	0.6	--	0.7	--	0.4	--			
21MAY79	920	-90	-89	-85	-88	-90	-85	-89	-84	63	63	15
		1.2	1.4	1.2	1.3	0.8	1.0	0.8	0.9			
21MAY79	1000	-86	-86	-82	-86	-89	-84	-88	-84	63	63	15
		1.4	1.6	1.3	1.5	1.3	1.4	1.2	1.4			
21MAY79	1225	-92	-91	-87	-90	-98	-92	-96	-91	63	63	15
		0.6	0.9	0.5	0.8	1.3	1.2	1.0	1.2			
21MAY79	1406	-91	-92	-87	-92	-86	-82	-85	-81	63	63	15
		0.3	0.4	0.3	0.3	0.5	0.4	0.4	0.5			
23MAY79	929	-89	-92	-90	-91	-101	-84	-99	-84	63	63	15
		0.6	0.6	0.6	0.7	0.8	0.7	0.4	0.7			
23MAY79	1005	-93	-94	-94	-93	-103	-84	-100	-84	63	63	15
		0.6	0.7	0.6	0.7	0.9	0.7	0.4	0.7			
23MAY79	1244	-88	-91	-88	-90	-97	-83	-95	-82	63	63	15
		1.0	1.1	1.0	1.1	0.8	0.8	0.7	0.8			
23MAY79	1423	-89	-90	-89	-89	-103	-89	-99	-89	63	63	15
		1.0	1.2	1.0	1.1	1.2	0.7	0.6	0.7			
24MAY79	911	-88	-88	-87	-89	-89	-87	-89	-86	63	63	15
		1.3	1.3	1.2	1.4	0.7	0.6	0.6	0.6			
24MAY79	1020	-89	-90	-89	-91	-90	-88	-90	-87	63	63	15
		1.3	1.4	1.3	1.4	0.8	0.8	0.7	0.7			
24MAY79	1255	-105	-107	-105	-107	-103	-97	-102	-95	63	63	15
		1.4	1.3	1.4	1.3	0.8	0.6	0.7	0.5			
25MAY79	905	--	-103	-104	-101	-100	-100	-101	-99	63	63	15
		--	1.4	0.9	1.2	0.8	0.8	0.6	0.7			
25MAY79	1011	--	-85	-88	-82	-84	-81	-84	-80	63	63	15
		--	1.4	1.6	1.3	1.6	1.5	1.6	1.5			
25MAY79	1107	--	-89	-90	-85	-86	-84	-86	-83	63	63	15
		--	1.1	1.2	1.3	1.0	1.0	1.0	1.1			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
25MAY79	1252	--	-98	-95	-94	-92	-92	-93	-91	63	63	15
		--	0.9	0.9	0.9	1.2	1.2	1.2	1.2			
29MAY79	925	-94	-95	-94	-94	-102	-95	-99	-94	63	63	15
		0.1	0.2	0.2	0.2	0.5	0.5	0.2	0.4			
29MAY79	1032	-95	-96	-95	-95	-102	-94	-98	-94	63	63	15
		0.1	0.1	0.1	0.1	0.5	0.5	0.1	0.4			
29MAY79	1244	-97	-95	-94	-94	-104	-97	-97	-98	63	63	15
		0.9	0.8	0.9	0.8	0.8	0.5	0.1	0.7			
29MAY79	1421	-97	-93	-94	-93	--	-98	-97	-100	63	63	15
		0.8	0.7	0.7	0.6	--	0.3	0.1	0.5			
31MAY79	933	-88	-90	-88	-90	-97	-96	-99	-96	63	63	15
		0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2			
31MAY79	1045	-92	-92	-91	-93	-99	-97	-99	-97	63	63	15
		0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2			
31MAY79	1234	--	-101	-102	-101	-103	-96	-99	-97	63	63	15
		--	0.3	0.3	0.3	0.4	0.2	0.2	0.2			
31MAY79	1421	--	-99	-100	-99	-102	-96	-99	-97	63	63	15
		--	0.2	0.2	0.2	0.4	0.2	0.2	0.2			
5JUN79	919	-94	-90	-94	-92	--	-94	-98	-93	63	63	15
		0.3	0.5	0.3	0.5	--	0.5	0.4	0.5			
5JUN79	1000	-91	-87	-90	-88	--	-92	-96	-92	63	63	15
		0.6	0.7	0.6	0.8	--	0.5	0.3	0.5			
5JUN79	1233	-97	-93	-94	-95	--	-90	-94	-93	63	63	15
		0.7	0.7	0.6	0.8	--	0.4	0.4	0.5			
5JUN79	1352	-94	-90	-93	-91	--	-88	-93	-90	63	63	15
		1.3	1.5	1.2	1.5	--	0.6	0.5	0.7			
6JUN79	911	-94	-97	-96	-97	--	-101	-103	-108	63	63	15
		0.1	0.1	0.1	0.1	--	0.1	0.1	0.2			
6JUN79	1018	-94	-97	-95	-96	--	-101	-100	--	63	63	15
		0.2	0.2	0.2	0.2	--	0.2	0.1	--			
6JUN79	1221	-92	-92	-91	-92	-99	-98	-99	-99	63	63	15
		0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2			
6JUN79	1251	-91	-90	-88	-89	-99	-96	-98	-97	63	63	15
		0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2			
7JUN79	931	-82	-82	-81	-81	-84	-80	-82	-81	63	63	15
		0.4	0.5	0.4	0.4	0.3	0.4	0.3	0.4			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	PA2	TEST LENGTH (MIN)
7JUN79	1039	-83	-81	-80	-79	-86	-82	-84	-83	63	63	15
		0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4			
7JUN79	1215	-78	-76	-78	-75	-86	-80	-84	-82	63	63	15
		1.1	1.3	1.1	1.2	0.7	0.9	0.7	0.9			
7JUN79	1353	-79	-78	-80	-77	-85	-78	-84	-81	63	63	15
		1.1	1.3	1.1	1.2	0.9	1.2	0.9	1.1			
11JUN79	920	-97	-97	-96	-96	-94	-91	-94	-91	63	63	15
		0.5	0.4	0.5	0.5	0.9	0.9	0.8	0.9			
11JUN79	1030	-99	-99	-99	-99	-99	-97	-98	-96	63	63	15
		0.4	0.3	0.5	0.4	0.6	0.7	0.6	0.7			
11JUN79	1250	-100	-99	-99	-99	-97	-93	-95	-93	63	63	15
		0.4	0.3	0.3	0.3	0.6	0.5	0.5	0.5			
11JUN79	1350	-99	-100	-98	-99	-100	-98	-98	-99	63	63	15
		0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3			
12JUN79	910	-89	-90	-87	-87	-97	-94	-97	-93	63	63	15
		0.5	0.5	0.4	0.6	0.6	0.6	0.6	0.6			
12JUN79	1025	-92	-92	-91	-90	-99	-93	-98	-94	63	63	15
		0.6	0.7	0.7	0.7	0.7	0.8	0.6	0.7			
12JUN79	1252	-97	-98	-97	-98	-102	-99	-98	-98	63	63	15
		0.8	0.9	0.9	1.0	1.0	0.9	0.7	0.7			
12JUN79	1430	-98	-95	-98	-94	-98	-92	-96	-93	63	63	15
		0.9	1.1	0.9	1.0	1.1	1.1	0.9	1.0			
13JUN79	910	-110	-106	-107	-104	-101	-97	-100	-98	63	63	15
		0.1	0.9	0.9	0.6	1.1	0.9	0.7	0.9			
13JUN79	1025	-99	-99	-103	-99	-102	-93	-99	-96	63	63	15
		0.4	1.1	0.8	0.9	1.2	0.9	0.6	0.9			
13JUN79	1300	-100	-99	-102	-98	-102	-94	-98	-96	63	63	15
		0.6	0.7	0.8	0.8	0.8	0.8	0.6	0.9			
13JUN79	1427	-95	-97	-94	-95	-104	-100	-99	-98	63	63	15
		0.8	1.0	0.8	0.9	0.7	0.7	0.4	0.7			
15JUN79	923	-93	-94	-94	-92	-94	-94	-96	-92	63	63	15
		0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3			
15JUN79	1050	-92	-90	-90	-88	-92	-91	-92	-90	63	63	15
		0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.2			
15JUN79	1150	-83	-84	-85	-83	-91	-88	-91	-88	63	63	15
		0.9	1.0	0.9	1.0	0.8	0.7	0.8	0.8			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
15JUN79	1250	-83	-85	-85	-84	-92	-90	-93	-90	63	63	15
		0.9	0.9	0.8	0.9	0.5	0.5	0.6	0.6			
7SEP79	955	-90	-91	-91	-91	-98	-93	-97	--	63	63	15
		0.6	0.7	0.5	0.6	0.5	0.5	0.5	--			
7SEP79	1055	-94	-95	-94	-95	-98	-93	-98	--	63	63	15
		0.4	0.4	0.3	0.4	0.4	0.5	0.4	--			
7SEP79	1250	-93	-93	-92	-92	-96	-93	-94	--	63	63	15
		0.4	0.5	0.4	0.4	0.2	0.2	0.2	--			
7SEP79	1430	-102	-99	-98	-98	-94	-92	-93	--	63	63	15
		0.5	0.4	0.3	0.4	0.5	0.6	0.5	--			
11SEP79	911	-94	-101	-94	-99	-109	-103	-99	-101	63	63	15
		0.2	0.3	0.2	0.3	--	0.5	0.2	0.4			
11SEP79	1030	-99	-103	-98	-101	-106	-99	-95	-99	63	63	15
		0.3	0.5	0.3	0.5	0.8	0.4	0.2	0.4			
11SEP79	1230	-103	-105	-98	-103	-104	-99	-94	-99	63	63	15
		0.5	0.7	0.3	0.5	0.7	0.5	0.2	0.5			
12SEP79	920	-76	-81	-74	-79	-83	-83	-81	-83	63	63	15
		0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2			
12SEP79	1050	-78	-80	-78	-80	-86	-84	-83	-83	63	63	15
		0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2			
12SEP79	1245	-81	-81	-78	-81	-88	-87	-85	-86	63	63	15
		0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.3			
12SEP79	1435	-84	-85	-82	-85	-89	-86	-85	-85	63	63	15
		0.2	0.3	0.2	0.3	0.4	0.5	0.4	0.4			
14SEP79	900	-97	-97	-96	-97	-88	-92	-95	-92	63	63	15
		2.1	1.7	2.2	1.7	1.7	1.6	1.8	1.4			
14SEP79	1020	-92	-91	-91	-90	-89	-90	-95	-91	63	63	15
		1.7	1.7	1.8	1.8	1.6	1.3	1.6	1.3			
14SEP79	1300	-89	-90	-89	-89	-83	-87	-89	-88	63	63	15
		1.5	1.4	1.4	1.4	1.1	1.0	1.3	1.3			
14SEP79	1425	-91	-92	-92	-92	-86	-89	-92	-90	63	63	15
		1.7	1.4	1.6	1.5	1.5	1.1	1.3	1.1			
17SEP79	930	-85	-88	-84	-88	-89	-87	-87	-87	63	63	15
		0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.2			
17SEP79	1030	-88	-90	-88	-90	-90	-87	-87	-88	63	63	15
		0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
17SEP79	1230	-94	-94	-93	-95	-94	-92	-91	-93	63	63	15
		0.3	0.4	0.4	0.5	0.2	0.3	0.2	0.3			
17SEP79	1430	-89	-92	-89	-92	-96	-93	-92	-94	63	63	15
		0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.3			
25SEP79	955	-86	-89	-86	-81	-88	-85	-86	-84	63	63	15
		0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.3			
25SEP79	1045	-85	-89	-86	-82	-87	-84	-82	-83	63	63	15
		0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.3			
25SEP79	1245	-90	-92	-88	-86	-93	-91	-89	-90	63	63	15
		0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2			
25SEP79	1445	-99	-97	-96	-92	-95	-92	-90	-91	63	63	15
		0.7	0.5	0.5	0.5	0.3	0.4	0.3	0.3			
26SEP79	915	-88	-92	-88	-89	-91	-90	-89	-92	63	63	15
		0.5	0.7	0.5	0.7	0.7	0.9	0.6	0.8			
26SEP79	1030	-89	-91	-88	-88	-95	-92	-91	-94	63	63	15
		0.6	0.8	0.6	0.7	0.7	0.9	0.5	0.9			
26SEP79	1225	--	-103	-101	-101	--	-99	-94	-108	63	63	15
		--	0.7	0.6	0.7	--	0.6	0.2	0.8			
26SEP79	1450	-98	-97	-97	-96	--	-97	-94	-101	63	63	15
		0.5	0.6	0.5	0.7	--	0.9	0.3	1.0			
27SEP79	930	-69	-69	-69	-71	-74	-77	-83	-87	63	63	15
		--	--	--	--	--	--	0.1	0.0			
27SEP79	1100	-90	-92	-89	-91	-94	-94	-92	-95	63	63	15
		0.2	0.3	0.2	0.3	0.1	0.2	0.1	0.3			
27SEP79	1300	-96	-96	-93	-95	--	-101	-97	-110	63	63	15
		0.2	0.2	0.2	0.2	--	0.3	0.1	0.1			
27SEP79	1430	-91	-93	-90	-92	--	-99	-98	-103	63	63	15
		0.3	0.4	0.3	0.4	--	0.3	0.2	0.5			
20CT79	955	-94	-97	-94	-96	--	-89	-91	-88	63	63	15
		0.2	0.2	0.2	0.2	--	0.3	0.2	0.2			
20CT79	1300	-93	-95	-91	-94	--	-90	-89	-90	63	63	15
		0.2	0.2	0.2	0.2	--	0.2	0.2	0.2			
20CT79	1445	-90	-93	-90	-92	--	-88	-88	-88	63	63	15
		0.3	0.4	0.3	0.3	--	0.3	0.2	0.2			
40CT79	910	-90	-93	-90	-93	-94	-94	-93	-92	63	63	15
		0.6	0.6	0.6	0.6	0.7	0.9	0.6	0.8			

FIRST LINE: RECEIVED SIGNAL LEVELS (DBM)
SECOND LINE: FADE RATES (HERTZ)

DATE	TIME	RCVR #0	RCVR #1	RCVR #2	RCVR #3	RCVR #4	RCVR #5	RCVR #6	RCVR #7	XMTR POWER (DBM) PA1	XMTR POWER (DBM) PA2	TEST LENGTH (MIN)
40CT79	1045	-93	-96	-92	-96	-98	-97	-95	-96	63	63	15
		0.9	1.1	0.8	1.1	1.1	1.0	0.7	1.0			
40CT79	1300	-92	-94	-91	-94	-96	-92	-91	-92	63	63	15
		1.1	1.2	1.1	1.1	1.1	1.2	0.9	1.1			
40CT79	1435	-87	-89	-86	-88	-95	-93	-93	-92	63	63	15
		1.1	1.4	1.0	1.3	0.5	1.1	0.8	1.1			
150CT79	1530	-99	-99	-98	-99	-101	-98	-97	-95	63	63	15
		0.7	0.8	0.6	0.7	1.4	1.2	0.9	1.1			
160CT79	920	-89	-93	-90	-91	-94	-92	-89	-91	63	63	15
		0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.4			
160CT79	1030	-92	-92	-91	-91	-99	-95	-92	-94	63	63	15
		0.4	0.5	0.4	0.5	0.4	0.5	0.3	0.6			
160CT79	1300	-87	-89	-84	-87	--	--	--	--	63	63	15
		0.2	0.3	0.2	0.3	--	--	--	--			
160CT79	1420	-89	-90	-85	-88	-97	-95	-89	-94	63	63	15
		0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.3			
180CT79	945	-87	-90	-88	-89	-89	-87	-87	-88	63	63	15
		0.5	0.6	0.5	0.5	0.6	0.7	0.5	0.6			
180CT79	1040	-86	-90	-87	-88	-90	-89	-89	-89	63	63	15
		0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.5			
180CT79	1300	-84	-91	-85	-89	-94	-94	-94	-94	63	63	15
		0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3			

APPENDIX E

MULTIPATH SPREAD FIELD TEST DATA

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
14DEC77	1037	1	166	5	187	81	2
14DEC77	1046	1	175	5	211	76	2
14DEC77	1053	3	158	7	189	21	2
14DEC77	1118	3	103	7	176	39	2
14DEC77	1134	0	139	4	145	109	2
14DEC77	1156	2	110	6	225	76	2
14DEC77	1205	2	85	6	199	77	2
19DEC77	1100	0	200	4	168	74	2
19DEC77	1112	0	233	4	190	52	2
19DEC77	1118	2	88	6	138	58	2
19DEC77	1125	2	118	6	138	78	2
19DEC77	1140	2	123	6	129	149	2
19DEC77	1147	2	134	6	168	86	2
19DEC77	1320	1	149	5	189	27	2
19DEC77	1327	1	120	5	179	20	2
19DEC77	1334	3	158	7	186	5	2
19DEC77	1340	3	137	7	196	-9	2
19DEC77	1355	3	166	7	182	-6	2
19DEC77	1403	3	151	7	145	-10	2
19DEC77	1408	1	210	5	103	-33	2
19DEC77	1416	1	88	5	104	-18	2
20DEC77	904	2	49	6	142	59	2
20DEC77	914	2	68	6	161	64	2
20DEC77	1117	0	122	4	160	158	2
20DEC77	1123	0	61	4	172	144	2
20DEC77	1129	2	94	6	159	84	2
20DEC77	1141	2	84	6	165	88	2
20DEC77	1152	1	116	5	136	72	2
20DEC77	1158	1	135	5	146	84	2
20DEC77	1205	3	126	7	112	62	2
20DEC77	1213	3	134	7	84	35	2
21DEC77	1448	0	169	4	149	85	2
21DEC77	1458	2	127	6	128	58	2
21DEC77	1506	1	117	5	94	-27	2
21DEC77	1515	3	121	7	100	0	2
22DEC77	935	0	144	4	85	96	2
22DEC77	942	2	125	6	158	83	2
22DEC77	953	2	121	6	149	73	2
22DEC77	1000	0	127	4	92	120	2
22DEC77	1028	1	135	5	172	24	2
22DEC77	1034	1	165	5	162	27	2
22DEC77	1040	3	159	7	173	3	2
22DEC77	1046	3	152	7	135	4	2
23DEC77	845	0	139	4	140	90	2
23DEC77	852	0	147	4	182	114	2
23DEC77	858	2	165	6	209	124	2
23DEC77	903	2	147	6	190	185	2
23DEC77	923	1	164	5	124	96	2
23DEC77	928	1	163	5	93	131	2
23DEC77	935	3	132	7	187	59	2
23DEC77	943	3	145	7	209	69	2
19JAN78	1129	1	139	5	115	3	2
19JAN78	1147	1	162	5	90	5	2
19JAN78	1154	3	137	7	115	13	2

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
19JAN78	1159	3	171	7	186	1	2
20JAN78	1030	1	162	5	156	17	2
20JAN78	1042	1	174	5	171	33	2
20JAN78	1047	3	173	7	194	59	2
20JAN78	1053	3	162	7	173	49	2
23JAN78	1349	1	44	5	169	5	2
23JAN78	1356	1	86	5	132	21	2
23JAN78	1404	3	89	7	139	47	2
23JAN78	1411	3	84	7	117	58	2
24JAN78	940	1	156	5	109	10	2
24JAN78	946	1	148	5	97	-7	2
24JAN78	957	3	123	7	83	9	2
24JAN78	1003	3	76	7	54	-2	2
25JAN78	958	1	175	5	158	59	2
25JAN78	1004	1	194	5	190	56	2
25JAN78	1012	3	142	7	169	108	2
25JAN78	1018	3	189	7	216	95	2
30JAN78	1010	1	218	5	166	79	2
30JAN78	1022	1	208	5	124	43	2
30JAN78	1027	3	215	7	114	78	2
30JAN78	1033	3	181	7	117	59	2
30JAN78	1039	0	212	4	129	85	2
30JAN78	1044	0	202	4	110	69	2
30JAN78	1050	2	125	6	96	56	2
30JAN78	1057	2	146	6	91	34	2
31JAN78	1051	0	90	4	151	56	2
31JAN78	1100	0	117	4	127	75	2
31JAN78	1108	2	70	6	110	45	2
31JAN78	1114	2	103	6	122	50	2
31JAN78	1124	1	210	5	151	15	2
31JAN78	1132	1	190	5	146	10	2
31JAN78	1138	3	141	7	117	30	2
31JAN78	1146	3	σ_4	7	119	55	2
1FEB78	921	0	209	4	201	99	2
1FEB78	927	0	118	4	172	47	2
1FEB78	933	2	139	6	181	105	2
1FEB78	940	2	170	6	152	110	2
1FEB78	948	1	243	5	238	31	2
1FEB78	955	1	187	5	246	57	2
1FEB78	1003	3	159	7	195	120	2
1FEB78	1009	3	141	7	194	126	2
3FEB78	945	0	103	4	122	61	2
3FEB78	952	0	75	4	181	45	2
3FEB78	958	2	80	6	141	10	2
3FEB78	1005	2	76	6	148	14	2
3FEB78	1036	1	156	5	251	-6	2
3FEB78	1041	1	136	5	336	-22	2
3FEB78	1050	3	141	7	329	40	2
3FEB78	1057	3	119	7	306	-34	2
13FEB78	1355	0	170	4	88	134	2
13FEB78	1402	0	213	4	185	124	2
13FEB78	1408	2	154	6	113	87	2
13FEB78	1413	2	142	6	104	87	2
13FEB78	1423	1	185	5	76	29	2

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
13FEB78	1429	1	189	5	93	41	2
13FEB78	1435	3	141	7	88	-3	2
13FEB78	1442	3	113	7	64	13	2
14FEB78	848	1	63	5	185	94	2
14FEB78	855	1	52	5	196	90	2
14FEB78	902	3	111	7	145	113	2
14FEB78	908	3	88	7	154	108	2
14FEB78	935	0	117	4	157	169	2
14FEB78	941	0	81	4	143	178	2
14FEB78	948	2	67	6	144	146	2
14FEB78	954	2	81	6	143	151	2
15FEB78	830	0	102	4	134	87	2
15FEB78	836	0	89	4	101	63	2
15FEB78	842	2	85	6	93	61	2
15FEB78	848	2	107	6	146	27	2
15FEB78	923	1	88	5	133	40	2
15FEB78	929	1	86	5	135	21	2
15FEB78	935	3	55	7	139	50	2
15FEB78	943	3	65	7	146	18	2
17FEB78	902	1	88	5	226	38	2
17FEB78	910	1	89	5	209	-21	2
17FEB78	917	3	55	7	238	72	2
17FEB78	923	3	78	7	253	102	2
17FEB78	943	0	33	4	133	27	2
17FEB78	947	0	84	4	107	55	2
17FEB78	1012	2	81	6	203	30	2
21FEB78	1353	0	143	4	46	28	2
21FEB78	1359	0	121	4	91	35	2
21FEB78	1406	2	119	6	64	37	2
21FEB78	1413	2	88	6	84	24	2
23FEB78	1540	1	126	5	233	47	2
23FEB78	1546	1	135	5	166	34	2
23FEB78	1552	3	137	7	214	61	2
23FEB78	1604	0	178	4	193	75	2
23FEB78	1610	0	141	4	182	88	2
23FEB78	1617	2	124	6	133	98	2
23FEB78	1623	2	103	6	126	75	2
24FEB78	908	2	119	6	384	59	15
24FEB78	928	0	145	4	119	65	15
24FEB78	950	1	134	5	142	-3	15
24FEB78	1013	3	127	7	141	13	15
1MAR78	919	0	159	4	113	126	15
1MAR78	949	2	177	6	101	106	15
1MAR78	1010	1	100	5	124	-10	15
1MAR78	1029	3	88	7	126	-1	15
1MAR78	1502	0	125	4	91	43	15
1MAR78	1522	2	129	6	77	42	15
1MAR78	1555	1	113	5	117	-8	15
1MAR78	1614	3	100	7	133	2	15
2MAR78	847	1	103	5	183	44	15
2MAR78	907	3	107	7	148	39	15
2MAR78	937	0	90	4	145	74	15
2MAR78	956	2	134	6	129	65	15
10MAR78	903	0	107	4	114	72	15

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
10MAR78	923	2	124	6	127	75	15
10MAR78	945	1	135	5	152	44	15
10MAR78	1005	3	114	7	146	58	15
10MAR78	1507	0	99	4	113	54	15
10MAR78	1525	2	114	6	129	30	15
10MAR78	1545	1	96	5	149	14	15
10MAR78	1607	3	76	7	159	13	15
13MAR78	1009	1	128	5	139	4	15
13MAR78	1029	3	136	7	165	-25	15
13MAR78	1051	0	107	4	109	70	15
13MAR78	1113	2	131	6	119	60	15
13MAR78	1515	0	114	4	104	57	15
13MAR78	1536	2	94	6	101	43	15
13MAR78	1556	1	86	5	156	-1	15
13MAR78	1615	3	94	7	231	30	15
14MAR78	843	3	158	7	165	94	15
14MAR78	902	1	131	5	180	50	15
14MAR78	928	0	135	4	168	116	15
14MAR78	1007	2	156	6	161	91	15
14MAR78	1458	0	101	4	125	30	15
14MAR78	1517	2	114	6	159	35	15
14MAR78	1545	1	99	5	141	-32	15
14MAR78	1605	3	122	7	164	-34	15
15MAR78	802	1	108	5	156	0	15
15MAR78	822	3	155	7	205	26	15
15MAR78	855	0	136	4	129	47	15
15MAR78	915	2	446	6	399	93	15
16MAR78	822	2	143	6	166	109	2
16MAR78	845	0	116	4	133	77	2
16MAR78	931	1	118	5	146	2	2
16MAR78	953	3	129	7	145	9	2
16MAR78	1453	0	103	4	113	31	2
16MAR78	1513	2	127	6	106	39	2
16MAR78	1532	1	88	5	125	-15	2
16MAR78	1551	3	97	7	142	2	2
21MAR78	1001	0	151	4	145	95	2
21MAR78	1020	2	167	6	142	93	2
21MAR78	1048	1	136	5	146	47	2
21MAR78	1108	3	140	7	152	59	2
21MAR78	1447	0	161	4	172	106	15
21MAR78	1503	2	223	6	187	93	15
21MAR78	1527	1	179	5	211	66	15
21MAR78	1545	3	197	7	233	64	15
22MAR78	830	3	169	7	213	105	15
22MAR78	849	1	126	5	239	70	15
22MAR78	911	0	81	4	135	97	15
22MAR78	930	2	125	6	145	79	15
23MAR78	904	0	84	4	105	33	15
23MAR78	925	2	111	6	118	34	15
23MAR78	947	1	85	5	209	5	15
23MAR78	1007	3	73	7	217	37	15
23MAR78	1509	0	90	4	191	145	15
23MAR78	1532	2	85	6	231	105	15
23MAR78	1552	1	105	5	172	113	15

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
23MAR78	1611	3	99	7	177	116	15
27MAR78	923	1	60	5	208	34	15
27MAR78	946	3	70	7	240	85	15
27MAR78	1020	0	60	4	156	132	15
27MAR78	1041	2	96	6	159	131	15
27MAR78	1448	2	122	6	153	75	15
27MAR78	1508	0	115	4	130	57	15
27MAR78	1528	3	132	7	122	9	15
27MAR78	1548	1	166	5	86	9	15
28MAR78	905	1	314	5	265	93	15
28MAR78	945	3	166	7	157	119	15
28MAR78	1012	2	105	6	191	143	15
28MAR78	1032	0	54	4	181	146	15
28MAR78	1050	1	170	5	193	110	15
28MAR78	1110	3	174	7	200	75	15
28MAR78	1130	2	116	6	198	133	15
28MAR78	1238	0	214	4	191	106	15
28MAR78	1258	1	117	5	147	50	15
28MAR78	1317	3	112	7	153	49	15
28MAR78	1337	2	110	6	122	80	15
28MAR78	1356	0	149	4	130	72	15
28MAR78	1418	1	126	5	143	131	15
28MAR78	1436	3	124	7	148	21	15
28MAR78	1455	2	120	6	112	58	15
28MAR78	1516	0	127	4	136	77	15
28MAR78	1535	1	140	5	133	86	15
28MAR78	1555	3	109	7	144	32	15
29MAR78	854	0	133	4	134	94	15
29MAR78	913	2	111	6	178	85	15
29MAR78	935	1	117	5	163	89	15
29MAR78	956	3	81	7	207	86	15
29MAR78	1017	0	96	4	73	63	15
29MAR78	1035	2	99	6	130	58	15
29MAR78	1054	1	76	5	167	30	15
29MAR78	1116	3	81	7	200	29	15
29MAR78	1135	0	77	4	99	65	15
29MAR78	1155	2	84	6	146	70	15
29MAR78	1215	1	110	5	252	42	15
29MAR78	1233	3	94	7	218	50	15
29MAR78	1306	2	138	6	131	76	15
29MAR78	1329	0	101	4	128	58	15
29MAR78	1357	1	109	5	141	2	15
29MAR78	1417	3	116	7	155	7	15
29MAR78	1436	0	110	4	113	49	15
29MAR78	1445	3	83	7	124	-26	15
29MAR78	1525	1	132	5	108	37	15
30MAR78	909	1	83	5	120	14	15
30MAR78	932	3	92	7	163	-15	15
30MAR78	955	0	92	4	114	40	15
30MAR78	1018	2	93	6	76	18	15
30MAR78	1050	1	65	5	87	-49	15
30MAR78	1109	3	74	7	102	-34	15
30MAR78	1129	0	87	4	66	29	15
30MAR78	1157	2	83	6	111	28	15

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
30MAR78	1228	1	91	5	101	-6	15
30MAR78	1335	0	65	4	95	37	15
30MAR78	1356	2	78	6	83	17	15
30MAR78	1418	1	48	5	145	-32	15
30MAR78	1438	3	56	7	130	7	15
30MAR78	1509	0	83	4	93	34	15
30MAR78	1535	3	77	7	97	-2	15
31MAR78	829	1	39	5	229	84	15
31MAR78	916	0	76	4	197	78	15
31MAR78	943	2	92	6	231	51	15
31MAR78	1008	3	49	7	289	125	15
4MAY78	955	1	117	3	91	67	15
4MAY78	1036	3	85	7	85	79	15
4MAY78	1051	1	91	5	182	40	15
4MAY78	1130	0	102	2	101	80	15
4MAY78	1153	0	95	4	183	111	15
4MAY78	1220	2	103	6	136	120	15
8MAY78	1356	0	141	4	198	72	15
8MAY78	1416	0	129	4	152	96	15
8MAY78	1452	2	156	6	199	105	15
18MAY78	1350	1	140	5	180	78	15
18MAY78	1415	3	118	7	218	105	15
18MAY78	1507	0	92	4	122	79	15
18MAY78	1526	2	102	6	121	75	15
29NOV78	1010	0	145	4	187	134	15
29NOV78	1030	1	132	5	178	122	15
29NOV78	1441	2	109	6	78	109	15
29NOV78	1501	3	127	7	157	63	15
30NOV78	935	0	93	4	178	56	15
30NOV78	1041	1	94	5	220	54	15
4DEC78	1020	0	137	4	122	151	15
4DEC78	1052	1	168	5	131	61	15
4DEC78	1258	2	112	6	171	112	15
5DEC78	942	0	103	0	0	-209	15
5DEC78	1037	1	103	5	219	78	15
5DEC78	1253	2	150	6	115	78	15
5DEC78	1446	3	175	7	165	74	15
6DEC78	1135	0	122	4	177	122	15
6DEC78	1249	2	188	6	213	98	15
7DEC78	1300	2	186	6	177	131	15
7DEC78	1455	3	304	7	159	-7	15
11DEC78	930	0	263	4	203	100	15
11DEC78	1033	1	129	5	109	72	15
12DEC78	924	0	224	4	216	86	15
12DEC78	1032	1	54	5	49	9	15
12DEC78	1052	2	298	6	261	161	15
13DEC78	1025	1	140	5	268	133	15
13DEC78	1116	0	256	4	232	125	15
13DEC78	1232	2	140	6	145	210	15
13DEC78	1407	3	132	7	93	4	15
18DEC78	1247	2	203	0	0	-413	15
2JAN79	1033	0	326	4	198	85	15
2JAN79	1105	1	260	5	167	103	15
2JAN79	1231	2	214	6	216	236	15

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
2JAN79	1334	3	317	7	138	155	15
21MAY79	920	0	92	4	151	172	15
21MAY79	1000	1	104	5	146	33	15
21MAY79	1225	2	93	6	200	144	15
21MAY79	1406	0	139	4	153	43	15
22MAY79	946	0	118	4	93	137	15
23MAY79	1005	1	226	5	184	252	15
23MAY79	1244	2	99	6	269	237	15
23MAY79	1423	3	159	7	343	132	15
24MAY79	1020	1	154	5	193	46	15
24MAY79	1255	2	194	6	155	192	15
24MAY79	1404	3	201	7	154	191	15
25MAY79	1011	1	215	5	128	59	15
25MAY79	1107	2	231	6	175	119	15
25MAY79	1252	3	221	7	195	94	15
29MAY79	1032	1	236	5	240	-10	15
29MAY79	1052	2	112	6	197	236	15
29MAY79	1120	3	149	7	248	213	15
31MAY79	1045	1	130	5	228	232	15
31MAY79	1234	2	86	6	155	233	15
31MAY79	1421	3	78	7	149	74	15
5JUN79	919	2	147	6	148	193	15
5JUN79	1000	1	204	5	209	130	15
5JUN79	1233	2	283	6	188	163	15
5JUN79	1352	1	163	5	183	101	15
6JUN79	911	1	139	5	185	109	15
6JUN79	1221	3	138	7	211	130	15
6JUN79	1251	0	77	4	223	165	15
7JUN79	931	0	54	4	145	80	15
7JUN79	1039	1	84	5	200	100	15
7JUN79	1215	2	104	6	211	180	15
7JUN79	1353	3	92	7	200	101	15
11JUN79	1030	1	196	5	175	149	15
11JUN79	1250	2	113	6	145	151	15
11JUN79	1350	3	204	7	156	105	15
12JUN79	1025	1	103	5	182	101	15
12JUN79	1252	2	117	6	172	243	15
12JUN79	1430	3	127	7	136	49	15
13JUN79	911	0	252	4	147	161	15
13JUN79	1025	1	202	5	201	94	15
13JUN79	1300	2	177	6	215	205	15
13JUN79	1427	3	97	7	181	84	15
15JUN79	923	0	137	4	125	110	15
15JUN79	1050	1	163	5	60	69	15
15JUN79	1150	2	86	6	153	151	15
15JUN79	1250	3	131	7	90	64	15
7SEP79	1055	1	196	5	155	63	15
7SEP79	1250	2	101	6	144	111	15
7SEP79	1430	3	186	7	142	73	15
11SEP79	911	0	100	4	203	75	15
11SEP79	1030	1	210	5	179	77	15
12SEP79	1050	1	110	5	195	134	15
12SEP79	1245	2	94	6	144	106	15
12SEP79	1435	3	100	7	240	175	15

DATE	TIME	MAIN BEAM RCVR #	MAIN BEAM MULTIPATH SPREAD (ns)	ELEVATED BEAM RCVR #	ELEVATED BEAM MULTIPATH SPREAD (ns)	RELATIVE DELAY (ns)	TEST LENGTH (min)
14SEP79	900	0	282	4	220	20	15
14SEP79	1020	1	316	5	327	125	15
14SEP79	1300	2	154	6	184	140	15
14SEP79	1425	3	264	7	229	224	15
17SEP79	930	0	120	4	126	113	15
17SEP79	1030	1	125	5	125	109	15
17SEP79	1430	3	151	7	187	97	15
25SEP79	955	0	134	4	127	94	15
25SEP79	1245	2	135	6	195	188	15
25SEP79	1445	3	215	7	169	163	15
26SEP79	1225	2	146	6	130	160	15
26SEP79	1450	3	152	7	121	137	15
27SEP79	930	0	92	4	65	64	15
27SEP79	1100	1	64	5	118	30	15
27SEP79	1430	3	76	7	227	83	15
20CT79	955	0	169	4	141	49	15
20CT79	1300	1	147	5	104	118	15
40CT79	1045	1	169	5	189	123	15
40CT79	1300	2	145	6	154	126	15
40CT79	1435	2	86	6	162	140	15
150CT79	1530	3	198	7	194	-16	15
160CT79	920	0	134	4	138	118	15
160CT79	1030	1	99	5	160	96	15
160CT79	1300	2	49	6	139	102	15
160CT79	1420	3	74	7	157	91	15
180CT79	945	0	137	4	115	41	15
180CT79	1040	1	108	5	125	66	15
180CT79	1300	2	113	6	153	108	15
180CT79	1430	3	197	7	145	154	15

APPENDIX F

CORRELATION COEFFICIENT FIELD TEST DATA

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
19DEC77	1253	1300	1	5	4	0. 464
19DEC77	1305	1300	3	7	4	0. 388
19DEC77	1328	1327	0	4	4	0. 779
19DEC77	1350	1355	2	6	4	0. 622
21DEC77	1525	--	0	4	4	0. 498
21DEC77	1535	--	3	7	4	0. 478
21DEC77	1543	--	2	6	4	0. 588
21DEC77	1552	--	1	5	4	0. 479
22DEC77	947	942	1	5	4	0. 385
22DEC77	959	953	3	7	3	0. 351
22DEC77	1026	1028	0	4	4	0. 563
22DEC77	1038	1040	2	6	4	0. 615
23DEC77	848	845	1	5	4	0. 476
23DEC77	903	903	3	7	4	0. 478
23DEC77	920	923	0	4	4	0. 447
23DEC77	935	935	2	6	4	0. 516
18JAN78	1545	1545	3	7	4	0. 351
18JAN78	1554	1545	1	5	4	0. 456
19JAN78	1327	1325	1	5	4	0. 410
19JAN78	1337	1325	3	7	4	0. 475
20JAN78	1115	1120	1	5	4	0. 511
20JAN78	1124	1120	3	7	4	0. 446
23JAN78	1439	1440	1	5	4	0. 373
23JAN78	1448	1440	3	7	4	0. 342
24JAN78	1014	1015	1	5	4	0. 512
24JAN78	1032	1032	3	7	4	0. 510
25JAN78	1026	1025	1	5	4	0. 543
25JAN78	1040	1038	3	7	4	0. 464
27JAN78	1125	1124	0	4	4	0. 775
27JAN78	1139	1140	1	5	4	0. 945
27JAN78	1151	1151	2	6	4	0. 608
27JAN78	1200	1205	3	7	4	0. 747
30JAN78	1105	1105	1	5	4	0. 506
30JAN78	1122	1120	3	7	4	0. 495
30JAN78	1135	1134	0	4	4	0. 588
30JAN78	1142	1146	2	6	4	0. 407
31JAN78	1322	1310	0	4	4	0. 565
31JAN78	1331	1325	2	6	4	0. 517
31JAN78	1339	1339	1	5	4	0. 562
31JAN78	1348	1352	3	7	4	0. 578
1FEB78	925	921	1	5	3	0. 742
1FEB78	935	921	3	7	4	0. 584
1FEB78	948	948	0	4	4	0. 553
1FEB78	1004	955	2	6	4	0. 489
3FEB78	950	952	1	5	4	0. 557
3FEB78	1003	958	3	7	4	0. 818
3FEB78	1017	1036	0	4	4	0. 554
3FEB78	1038	1041	2	6	4	0. 673
13FEB78	1339	1355	1	5	4	0. 646
13FEB78	1400	1408	3	7	4	0. 391
13FEB78	1425	1423	0	4	4	0. 732
13FEB78	1441	1442	2	6	4	0. 624
14FEB78	852	848	0	4	4	0. 580
14FEB78	906	908	2	6	4	0. 541

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
14FEB78	926	935	1	5	4	0.504
14FEB78	938	935	3	7	4	0.380
14FEB78	951	948	1	3	2	0.442
14FEB78	957	954	5	7	2	0.666
15FEB78	838	836	1	5	4	0.525
15FEB78	847	848	3	7	2	0.504
15FEB78	929	929	0	4	4	0.519
15FEB78	950	943	2	6	4	0.724
15FEB78	1010	943	0	1	4	0.497
15FEB78	1020	943	2	3	4	0.371
16FEB78	845	841	0	4	4	0.881
16FEB78	856	848	2	6	4	0.690
16FEB78	910	913	1	5	3	0.999
16FEB78	945	946	3	7	4	0.701
17FEB78	906	910	0	4	4	0.431
17FEB78	920	923	2	6	4	0.632
17FEB78	944	943	1	5	4	0.541
17FEB78	1002	1012	3	7	4	0.440
17FEB78	1025	1012	0	3	4	0.299
17FEB78	1035	1012	1	2	4	0.333
17FEB78	1045	1012	0	1	1	0.325
21FEB78	1426	1413	1	5	4	0.351
21FEB78	1445	1413	3	7	4	0.296
21FEB78	1455	1413	0	4	4	0.552
21FEB78	1516	1413	2	6	4	0.428
23FEB78	857	--	1	5	4	0.751
23FEB78	904	--	3	7	4	0.691
23FEB78	917	--	5	7	4	0.753
23FEB78	925	--	1	3	4	0.876
23FEB78	1525	1540	0	4	4	0.586
23FEB78	1543	1540	2	6	4	0.529
23FEB78	1556	1552	0	2	2	0.621
23FEB78	1605	1604	1	5	4	0.338
23FEB78	1630	1623	3	7	1	0.325
24FEB78	910	908	3	7	4	0.455
24FEB78	920	908	1	5	4	0.486
24FEB78	930	928	1	3	4	0.462
24FEB78	940	928	5	7	4	0.484
24FEB78	949	950	0	4	4	0.615
24FEB78	1002	950	2	6	4	0.636
24FEB78	1011	1013	4	6	4	0.533
24FEB78	1024	1013	0	2	4	0.540
24FEB78	1035	1013	0	1	4	0.551
24FEB78	1045	1013	0	3	4	0.475
24FEB78	1055	1013	2	3	4	0.369
24FEB78	1104	1013	1	2	4	0.400
27FEB78	931	--	1	5	4	0.563
27FEB78	952	--	3	7	4	0.494
27FEB78	1005	--	1	3	4	0.514
27FEB78	1016	--	5	7	4	0.603
27FEB78	1025	--	3	5	2	0.416
27FEB78	1031	--	1	7	2	0.334
27FEB78	1105	--	0	4	4	0.530
27FEB78	1120	--	2	6	4	0.524

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
1MAR78	947	949	1	5	4	0.514
1MAR78	953	949	3	7	4	0.448
1MAR78	1005	1010	1	3	1	0.489
1MAR78	1020	1010	0	4	4	0.687
1MAR78	1029	1029	2	6	4	0.574
1MAR78	1515	1522	1	5	4	0.502
1MAR78	1531	1522	3	7	2	0.377
1MAR78	1600	1555	0	4	4	0.632
1MAR78	1613	1614	2	6	4	0.496
2MAR78	858	847	0	4	4	0.655
2MAR78	913	907	2	6	4	0.693
2MAR78	938	937	1	5	4	0.465
2MAR78	945	956	3	7	4	0.419
10MAR78	908	903	1	5	4	0.455
10MAR78	924	923	3	7	4	0.487
10MAR78	946	945	0	4	4	0.539
10MAR78	1006	1005	2	6	4	0.572
10MAR78	1512	1507	1	5	4	0.562
10MAR78	1522	1525	3	7	4	0.878
10MAR78	1538	1545	0	4	4	0.550
10MAR78	1554	1545	2	6	4	0.742
10MAR78	1604	1607	1	3	1	0.641
10MAR78	1615	1607	0	2	4	0.564
13MAR78	952	1009	0	4	4	0.512
13MAR78	1005	1009	2	6	4	0.502
13MAR78	1017	1009	0	2	4	0.644
13MAR78	1023	1029	4	6	4	0.685
13MAR78	1054	1051	3	7	4	0.444
13MAR78	1102	1051	1	5	4	0.383
13MAR78	1112	1113	1	3	4	0.616
13MAR78	1122	1113	5	7	4	0.334
13MAR78	1412	1412	0	1	4	0.429
13MAR78	1421	1412	0	1	4	0.438
13MAR78	1440	1440	2	3	4	0.253
13MAR78	1455	1455	4	5	4	0.240
13MAR78	1504	1506	6	7	4	0.371
13MAR78	1516	1515	1	5	4	0.507
13MAR78	1525	1515	3	7	4	0.360
13MAR78	1533	1536	1	3	4	0.518
13MAR78	1541	1536	5	7	4	0.472
13MAR78	1557	1556	0	4	4	0.547
13MAR78	1604	1556	2	6	4	0.477
13MAR78	1610	1615	0	2	4	0.453
13MAR78	1618	1615	4	6	4	0.527
14MAR78	848	843	0	4	4	0.492
14MAR78	856	843	2	6	4	0.356
14MAR78	906	902	0	2	4	0.366
14MAR78	918	928	4	6	4	0.542
14MAR78	930	928	1	5	4	0.408
14MAR78	938	928	3	7	4	0.433
14MAR78	943	928	1	3	4	0.445
14MAR78	954	1007	5	7	4	0.527
14MAR78	1500	1458	1	5	4	0.510
14MAR78	1520	1517	3	7	4	0.628

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
14MAR78	1528	1517	1	3	4	0.277
14MAR78	1537	1545	5	7	4	0.583
14MAR78	1558	1605	0	4	4	0.565
14MAR78	1610	1605	2	6	4	0.558
14MAR78	1615	1605	0	2	4	0.497
15MAR78	806	802	0	4	4	0.641
15MAR78	831	822	2	6	4	0.565
15MAR78	900	855	1	5	4	0.507
15MAR78	908	855	3	7	4	0.464
15MAR78	918	915	1	3	4	0.509
15MAR78	928	915	5	7	4	0.434
16MAR78	1052	1052	0	4	4	0.635
16MAR78	1102	1102	1	5	4	0.415
16MAR78	1115	1115	2	6	4	0.348
16MAR78	1127	1127	3	7	4	0.567
16MAR78	1141	--	0	1	2	0.239
16MAR78	1148	1148	2	3	3	0.484
16MAR78	1156	1148	1	2	3	0.398
16MAR78	1206	1216	4	5	4	0.474
16MAR78	1218	1216	6	7	4	0.603
16MAR78	1454	1453	1	5	4	0.581
16MAR78	1503	1453	3	7	4	0.538
16MAR78	1519	1513	1	3	4	0.698
16MAR78	1530	1532	0	4	4	0.540
16MAR78	1545	1551	2	6	4	0.535
21MAR78	1005	1001	1	5	4	0.450
21MAR78	1012	1020	3	7	4	0.458
21MAR78	1039	1020	1	3	4	0.337
21MAR78	1052	1048	0	4	4	0.524
21MAR78	1101	1108	2	6	4	0.500
21MAR78	1117	1108	0	2	4	0.383
21MAR78	1459	1503	1	5	4	0.547
21MAR78	1509	1503	3	7	4	0.438
21MAR78	1515	1503	1	3	4	0.491
21MAR78	1529	1527	0	4	4	0.499
21MAR78	1540	1527	2	6	4	0.471
21MAR78	1553	1545	0	2	4	0.441
22MAR78	847	849	0	4	4	0.725
22MAR78	857	849	2	6	4	0.632
22MAR78	912	910	1	5	4	0.849
22MAR78	920	910	3	7	4	0.818
23MAR78	847	904	1	5	4	0.538
23MAR78	854	904	3	7	4	0.505
23MAR78	913	904	1	3	4	0.439
23MAR78	925	925	5	7	4	0.592
23MAR78	954	947	0	4	4	0.654
23MAR78	1000	947	2	6	4	0.627
23MAR78	1009	1007	0	2	4	0.613
23MAR78	1019	1007	4	6	4	0.672
23MAR78	1517	1509	1	5	4	0.492
23MAR78	1525	1509	3	7	4	0.561
23MAR78	1550	1552	0	4	4	0.598
23MAR78	1605	1611	2	6	4	0.711
27MAR78	934	923	0	4	4	0.577

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
27MAR78	1001	946	2	6	4	0.645
27MAR78	1023	1020	1	5	4	0.496
27MAR78	1032	1020	3	7	4	0.520
27MAR78	1455	1448	3	7	4	0.545
27MAR78	1504	1508	1	5	4	0.599
27MAR78	1535	1528	0	4	4	0.576
27MAR78	1552	1548	2	6	4	0.409
28MAR78	910	905	0	4	3	0.573
28MAR78	1020	1012	0	4	3	0.596
28MAR78	1032	1032	1	5	3	0.498
28MAR78	1038	1032	2	6	3	0.617
28MAR78	1050	1050	3	7	3	0.533
28MAR78	1058	1050	0	2	3	0.396
28MAR78	1132	1130	0	4	3	0.512
28MAR78	1148	1150	1	5	3	0.393
28MAR78	1158	1150	3	7	3	0.508
28MAR78	1208	1150	2	6	3	0.515
28MAR78	1248	1238	1	5	3	0.695
28MAR78	1300	1258	0	4	3	0.600
28MAR78	1310	1258	3	7	3	0.535
28MAR78	1320	1317	2	6	3	0.548
28MAR78	1350	1337	1	5	3	0.572
28MAR78	1402	1356	3	7	3	0.536
28MAR78	1420	1418	2	6	3	0.579
28MAR78	1427	1418	0	4	3	0.619
28MAR78	1445	1436	1	5	3	0.476
28MAR78	1455	1455	3	7	3	0.642
28MAR78	1510	1455	0	4	3	0.592
28MAR78	1520	1516	2	6	3	0.568
28MAR78	1605	1555	1	5	3	0.582
28MAR78	1616	1555	0	4	2	0.403
29MAR78	858	854	2	6	3	0.466
29MAR78	903	854	3	7	3	0.621
29MAR78	912	913	1	5	3	0.811
29MAR78	920	913	0	4	3	0.686
29MAR78	1010	956	2	6	3	0.659
29MAR78	1020	1017	3	7	3	0.623
29MAR78	1026	1017	1	5	2	0.627
29MAR78	1036	1035	0	4	3	0.578
29MAR78	1109	1054	2	6	3	0.692
29MAR78	1133	1135	0	4	3	0.537
29MAR78	1137	1135	1	5	3	0.840
29MAR78	1200	1155	3	7	3	0.806
29MAR78	1219	1215	2	6	3	0.747
29MAR78	1235	1233	0	4	3	0.849
29MAR78	1358	1357	0	4	3	0.719
29MAR78	1404	1357	2	6	3	0.510
29MAR78	1411	1357	3	7	3	0.808
29MAR78	1418	1417	1	5	3	0.752
29MAR78	1520	1525	1	5	3	0.676
29MAR78	1526	1525	3	7	3	0.586
29MAR78	1534	1525	2	6	3	0.610
29MAR78	1552	1548	0	4	3	0.579
29MAR78	1609	1606	1	5	3	0.647

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
29MAR78	1622	1606	3	7	3	0.716
30MAR78	920	909	3	7	3	0.428
30MAR78	937	932	2	6	3	0.482
30MAR78	945	955	0	4	3	0.681
30MAR78	1003	955	1	5	3	0.644
30MAR78	1106	1109	2	6	3	0.617
30MAR78	1113	1109	1	5	3	0.499
30MAR78	1127	1129	0	4	3	0.541
30MAR78	1138	1129	3	7	3	0.513
30MAR78	1338	1335	3	7	3	0.345
30MAR78	1347	1335	2	6	3	0.201
30MAR78	1405	1356	1	5	3	0.466
30MAR78	1410	1418	0	4	3	0.428
30MAR78	1444	1438	2	6	3	0.250
30MAR78	1538	1535	3	7	3	0.555
30MAR78	1545	1535	0	4	2	0.570
30MAR78	1600	1535	1	5	3	0.523
29NOV78	1010	1010	1	5	4	0.337
29NOV78	1050	1030	2	6	3	0.795
30NOV78	935	935	1	5	3	0.928
30NOV78	1041	1041	2	6	4	0.670
30NOV78	1250	1250	3	7	3	0.682
4DEC78	1020	1020	1	5	4	0.242
4DEC78	1052	1052	2	6	4	0.592
5DEC78	942	942	1	5	4	0.582
5DEC78	1037	1037	2	6	3	0.763
5DEC78	1253	1253	3	7	3	0.433
5DEC78	1446	1446	0	4	4	0.411
7DEC78	941	940	1	5	4	0.397
7DEC78	1041	1041	2	6	4	0.548
11DEC78	930	930	0	4	3	0.336
11DEC78	1033	1033	2	6	4	0.414
11DEC78	1318	1318	3	7	3	0.809
11DEC78	1403	1403	3	7	4	0.580
11DEC78	1441	1440	0	4	4	0.760
12DEC78	926	924	1	5	3	0.414
12DEC78	1032	1032	2	6	4	0.639
12DEC78	1052	1052	3	7	5	0.478
12DEC78	1552	0	0	4	3	0.635
13DEC78	1025	1025	0	4	3	0.697
13DEC78	1116	1116	1	5	4	0.751
13DEC78	1232	1232	3	7	5	0.341
13DEC78	1419	1407	3	7	1	0.708
18DEC78	1115	1115	1	5	4	0.429
18DEC78	1248	1247	2	6	4	0.550
18DEC78	1352	0	3	7	4	0.396
2JAN79	1033	1033	1	5	4	0.696
2JAN79	1106	1105	2	6	5	0.999
2JAN79	1232	1231	3	7	5	0.547
2JAN79	1335	1334	0	4	6	0.715
3JAN79	1117	1115	1	5	4	0.748
3JAN79	1153	1150	2	6	4	0.854
3JAN79	1308	1305	2	6	4	0.731
3JAN79	1442	1440	3	7	2	0.474

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
15JAN79	1053	1053	1	5	6	0.601
15JAN79	1120	1120	2	6	5	0.624
15JAN79	1239	1230	3	7	6	0.468
15JAN79	1358	1355	0	4	4	0.920
16JAN79	931	931	1	5	4	0.563
16JAN79	1014	1012	2	6	2	0.484
16JAN79	1227	1226	3	7	4	0.560
16JAN79	1414	1414	0	4	5	0.797
17JAN79	934	934	0	4	5	0.865
17JAN79	1040	1040	2	6	5	0.723
23JAN79	925	925	1	5	5	0.606
23JAN79	1030	1028	2	6	5	0.618
23JAN79	1258	1258	3	7	5	0.817
23JAN79	1450	1450	0	4	5	0.799
24JAN79	1021	1017	0	4	6	0.608
24JAN79	1102	1100	2	6	4	0.887
24JAN79	1205	1205	3	7	5	0.623
24JAN79	1502	1502	0	4	7	0.987
26JAN79	930	930	1	5	4	0.375
26JAN79	1038	1038	2	6	4	0.853
26JAN79	1235	1235	3	7	4	0.499
26JAN79	1432	1432	0	4	4	0.010
15FEB79	910	910	1	5	5	0.499
15FEB79	1017	1017	2	6	5	0.566
2APR79	1020	1020	1	5	5	0.320
2APR79	1330	1330	0	4	4	0.453
5APR79	923	923	1	5	5	0.496
5APR79	916	916	0	4	5	0.523
5JUN79	919	919	3	7	5	0.449
5JUN79	1000	1000	2	6	3	0.329
6JUN79	1018	1018	3	7	4	0.510
6JUN79	1251	1251	1	5	5	0.411
7JUN79	931	931	1	5	2	0.433
7JUN79	1039	1039	2	6	4	0.268
11JUN79	1250	1250	3	7	2	0.466
11JUN79	1350	1350	0	4	2	0.747
12JUN79	910	910	1	5	4	0.306
12JUN79	1025	1025	2	6	5	0.434
12JUN79	1252	1252	3	7	4	0.335
12JUN79	1430	1430	0	4	5	0.379
13JUN79	911	911	1	5	2	0.742
13JUN79	1025	1025	2	6	4	0.704
13JUN79	1300	1300	3	7	3	0.253
13JUN79	1427	1427	0	4	4	0.496
15JUN79	923	923	1	5	5	0.302
15JUN79	1050	1050	2	6	5	0.587
15JUN79	1150	1150	3	7	5	0.262
15JUN79	1250	1250	0	4	4	0.382
7SEP79	955	955	1	5	2	0.312
7SEP79	1055	1055	2	6	2	0.585
7SEP79	1250	1250	3	7	1	0.382
12SEP79	920	920	1	5	2	0.434
12SEP79	1050	1050	2	6	1	0.299
12SEP79	1245	1245	3	7	1	0.141

DATE	TIME	RSL TIME	RCVR TO PORT 1	RCVR TO PORT 2	NUMBER OF RUNS	AVERAGE CORRELATION COEFFICIENT
12SEP79	1435	1435	0	4	2	0.542
17SEP79	930	930	1	5	3	0.301
17SEP79	1030	1030	2	6	4	0.369
25SEP79	1045	1045	2	6	5	0.426
25SEP79	1245	1245	3	7	4	0.446
25SEP79	1445	1445	0	4	4	0.279
26SEP79	915	915	1	5	5	0.391
26SEP79	1030	1030	2	6	4	0.469
26SEP79	1450	1450	0	4	4	0.503
27SEP79	930	930	1	5	2	0.947
27SEP79	1100	1100	2	6	4	0.462
27SEP79	1305	1305	3	7	2	0.467
27SEP79	1430	1430	0	4	3	0.359
20CT79	955	955	1	5	2	0.640
20CT79	1300	1300	2	6	1	0.164
20CT79	1445	1445	3	7	1	0.144
40CT79	1045	1045	1	5	3	0.328
150CT79	1530	1530	0	4	3	0.314
160CT79	920	920	1	5	4	0.480
160CT79	1030	1030	2	6	4	0.291
160CT79	1300	1300	3	7	4	0.385
160CT79	1420	1420	0	4	4	0.393
180CT79	945	945	1	5	3	0.512
180CT79	1040	1040	2	6	4	0.391
180CT79	1300	1300	3	7	3	0.536
180CT79	1430	1430	0	4	4	0.404

APPENDIX G

BIT ERROR RATE FIELD TEST DATA

CONFIGURATION

DUAL SPACE, DUAL FREQUENCY

DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1103	1423	7.72	0.11E-04	20
1103	1448	6.97	0.16E-04	20
1103	1513	7.47	0.74E-05	20
1103	1538	7.22	0.11E-03	20
1103	1603	1.97	0.13E-02	20
1104	1029	12.22	0.72E-06	20
1104	1138	11.97	0.66E-06	20
1104	1202	10.72	0.23E-05	20
1104	1354	6.97	0.15E-03	20
1105	1030	11.22	0.58E-06	20
1105	1053	11.97	0.72E-06	20
1105	1116	12.22	0.17E-06	20
1105	1138	13.72	0.99E-07	20
1105	1200	11.47	0.20E-05	20
1105	1503	9.22	0.12E-05	20
1105	1527	8.47	0.20E-04	20
1105	1550	11.72	0.25E-03	20
1106	1150	5.22	0.20E-02	20
1106	1413	3.47	0.11E-02	20
1111	1347	4.72	0.62E-03	20
1112	1017	5.72	0.33E-03	20
1112	1038	6.22	0.24E-03	20
1112	1102	9.47	0.48E-03	20
1112	1124	4.72	0.73E-03	20
1112	1201	1.47	0.54E-02	20
1112	1223	1.47	0.10E-01	20
1112	1313	0.47	0.83E-02	20
1113	1418	6.72	0.78E-04	20
1113	1448	6.97	0.32E-04	20
1113	1553	6.22	0.71E-04	20
1113	1617	5.47	0.10E-03	20
1222	1158	1.72	0.49E-02	20
1222	1244	1.72	0.47E-02	20
1222	1305	2.72	0.34E-02	20
1222	1328	5.47	0.82E-03	20
1222	1349	6.72	0.68E-03	20
1222	1410	7.47	0.56E-03	20
1222	1432	8.47	0.38E-03	20
1222	1454	9.72	0.36E-03	20
1327	1045	1.08	0.32E-01	20
1327	1100	0.58	0.58E-01	10
1327	1113	0.58	0.99E-01	10
1330	1156	13.33	0.23E-05	20
1330	1303	13.08	0.28E-05	20
1330	1326	12.58	0.12E-05	20
1330	1347	11.08	0.39E-04	20
1330	1435	14.58	0.34E-06	20
1330	1458	14.08	0.86E-06	20
1330	1520	15.83	0.16E-06	20
1330	1541	17.83	0.58E-07	20
1401	1035	8.83	0.36E-03	20
1401	1047	9.83	0.18E-03	10
1413	1511	3.42	0.48E-02	20
1413	1523	4.25	0.26E-02	20
1413	1545	5.00	0.20E-02	20
1413	1612	4.00	0.42E-02	10
1414	1006	4.75	0.14E-02	20
1414	1029	4.25	0.23E-02	20
1414	1051	4.00	0.22E-02	20
1414	1115	3.50	0.40E-02	20
1414	1140	3.00	0.45E-02	20
1414	1228	2.17	0.83E-02	20

CONFIGURATION

DUAL SPACE, DUAL FREQUENCY

DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1414	1328	2.67	0.70E-02	20
1414	1352	2.92	0.61E-02	20
1414	1415	2.92	0.46E-02	20
1414	1453	3.42	0.32E-02	10
1414	1510	3.75	0.22E-02	10
1414	1522	3.42	0.26E-02	20
1414	1551	3.75	0.15E-02	20
1414	1615	4.50	0.11E-02	10
1415	1418	8.33	0.26E-03	20
1415	1450	9.08	0.67E-04	20
1415	1510	9.08	0.45E-04	20
1415	1605	7.83	0.10E-03	20
1416	1011	2.67	0.91E-02	20
1416	1126	3.42	0.14E-02	20
1416	1201	2.92	0.63E-02	20
1416	1301	4.75	0.10E-02	20
1416	1330	7.50	0.24E-03	20
1416	1405	9.08	0.32E-04	20
1416	1427	9.83	0.12E-04	20
1416	1449	9.58	0.19E-04	20
1416	1511	9.58	0.20E-04	20
1416	1532	9.08	0.31E-03	20
1416	1554	8.58	0.50E-03	20
1417	1100	15.08	0.32E-06	20
1417	1125	15.83	0.79E-07	20
1417	1229	15.08	0.74E-07	20
1417	1300	15.08	0.68E-06	20
1421	1545	6.08	0.50E-03	20
1422	1027	0.58	0.59E-01	20
1422	1155	1.08	0.12E+00	20
1423	1210	14.58	0.59E-05	20
1423	1232	13.33	0.92E-05	20
1423	1255	9.83	0.16E-03	20
1423	1325	7.58	0.36E-03	20
1423	1348	6.58	0.11E-02	20
1423	1412	5.83	0.15E-02	20
1423	1435	4.08	0.28E-02	20
1423	1458	5.83	0.12E-02	20
1424	1115	7.33	0.40E-03	20
1424	1137	7.58	0.27E-03	20
1425	1121	6.17	0.30E-01	20
1425	1145	0.13	0.49E-01	10
1425	1200	0.13	0.50E-01	10
1425	1213	0.13	0.22E-01	10
1425	1230	0.37	0.91E-01	20
1426	1113	0.73	0.21E-01	20
1426	1136	3.10	0.51E-02	10
1426	1150	3.83	0.36E-02	10
1426	1202	3.58	0.36E-02	10
1426	1214	4.08	0.31E-02	10
1426	1230	4.33	0.32E-02	10
1426	1243	4.58	0.22E-02	20
1426	1305	4.58	0.22E-02	20
1426	1423	6.58	0.75E-03	20
1426	1445	4.33	0.31E-02	20
1427	1134	7.08	0.35E-03	20

CONFIGURATION

DUAL SPACE, DUAL ANGLE, 4.50 GHZ

DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1222	1432	8.22	0.20E-03	20
1327	1045	1.50	0.16E-01	20
1327	1100	1.00	0.26E-01	10
1327	1113	0.50	0.11E-01	10
1330	1435	12.75	0.14E-04	20
1330	1458	11.75	0.15E-04	20
1414	1140	2.38	0.84E-02	20
1414	1228	2.38	0.82E-02	20
1414	1328	3.63	0.43E-02	20
1416	1330	5.38	0.11E-02	20
1416	1405	9.50	0.83E-04	20
1416	1427	10.50	0.42E-04	20
1416	1449	8.75	0.23E-04	20
1417	1100	14.00	0.10E-05	20
1417	1300	15.50	0.39E-06	20
1423	1412	2.75	0.14E-01	20
1423	1435	1.63	0.16E-02	20
1424	1115	3.75	0.88E-02	20
1425	1121	0.13	0.58E-01	20
1425	1133	0.13	0.66E-01	10
1425	1145	0.13	0.57E-01	10
1425	1200	0.13	0.44E-02	10
1426	1136	1.38	0.35E-01	20
1426	1150	1.75	0.26E-01	10
1426	1202	1.50	0.22E-01	10
1426	1214	2.00	0.19E-01	10
1426	1230	2.25	0.16E-01	10
1426	1445	2.25	0.28E-01	20

CONFIGURATION

DUAL SPACE, DUAL ANGLE, 4.69 GHZ

DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1222	1454	10.47	0.51E-04	20
1317	1514	1.33	0.44E-01	20
1317	1514	1.33	0.58E-01	4
1318	1044	1.50	0.23E-01	20
1318	1044	1.50	0.32E-01	4
1318	1113	0.83	0.32E-01	10
1318	1113	0.83	0.42E-01	10
1318	1242	3.08	0.70E-02	10
1318	1242	3.08	0.81E-02	10
1318	1313	6.33	0.14E-02	10
1318	1313	6.33	0.27E-02	10
1318	1324	6.83	0.70E-03	10
1318	1324	6.83	0.71E-03	10
1318	1338	7.08	0.62E-03	10
1318	1338	7.08	0.59E-03	10
1318	1352	6.58	0.11E-03	10
1318	1352	6.58	0.11E-03	10
1318	1407	7.08	0.77E-03	10
1318	1407	7.08	0.63E-03	10
1318	1421	7.58	0.56E-03	10
1318	1421	7.58	0.41E-03	10
1318	1435	8.83	0.29E-03	10
1318	1435	8.83	0.18E-03	10
1318	1447	10.58	0.13E-03	10
1318	1447	10.58	0.42E-04	10
1318	1500	9.83	0.87E-03	10
1318	1517	8.83	0.12E-03	10
1318	1517	8.83	0.18E-03	10
1319	1400	9.83	0.36E-04	20
1319	1400	9.83	0.54E-04	10
1319	1412	9.08	0.72E-04	20
1319	1412	9.08	0.12E-03	20
1319	1435	7.58	0.14E-03	20
1319	1435	7.58	0.22E-03	20
1319	1458	6.83	0.17E-03	20
1319	1458	6.83	0.26E-03	20
1319	1522	6.58	0.28E-03	20
1319	1522	6.58	0.45E-03	20
1319	1543	7.83	0.87E-04	20
1319	1543	7.83	0.15E-03	20
1320	1137	6.33	0.40E-03	20
1320	1137	6.33	0.59E-03	10
1320	1150	6.83	0.22E-03	20
1320	1150	6.83	0.34E-03	20
1320	1213	7.33	0.12E-03	10
1320	1213	7.33	0.20E-03	10
1323	1458	5.33	0.35E-03	20
1323	1458	5.33	0.57E-03	10
1323	1517	8.83	0.35E-04	10
1323	1517	8.83	0.92E-04	10
1323	1531	11.83	0.84E-05	20
1323	1531	11.83	0.29E-04	20
1324	1117	13.83	0.18E-05	20
1324	1117	13.83	0.92E-05	20
1324	1138	13.58	0.18E-05	20
1324	1138	13.58	0.11E-04	20
1324	1200	11.83	0.93E-05	20
1324	1200	11.83	0.50E-04	20
1325	1118	6.83	0.42E-03	20
1325	1118	6.83	0.58E-03	20

CONFIGURATION

DUAL SPACE, DUAL ANGLE, 4.69 GHZ

DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)	DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1325	1143	7.58	0.30E-03	20					
1325	1143	7.58	0.42E-03	20					
1325	1243	14.83	0.70E-06	20					
1325	1243	14.83	0.12E-05	20					
1325	1348	10.83	0.14E-04	20					
1325	1348	10.83	0.27E-04	20					
1325	1413	9.58	0.34E-04	20					
1325	1413	9.58	0.60E-04	20					
1325	1437	8.83	0.53E-04	20					
1325	1437	8.83	0.94E-04	20					
1325	1458	8.33	0.14E-03	20					
1325	1458	8.33	0.22E-03	20					
1325	1521	5.83	0.69E-03	20					
1325	1521	5.83	0.10E-02	20					
1325	1544	4.33	0.21E-02	20					
1325	1544	4.33	0.30E-02	20					
1325	1606	1.33	0.96E-02	20					
1325	1606	1.33	0.13E-01	20					
1428	955	6.83	0.40E-03	20					
1428	1008	1.33	0.11E-01	10					
1428	1044	4.33	0.17E-02	10					
1428	1055	4.33	0.43E-01	10					
1428	1107	5.08	0.11E-02	10					
1428	1120	5.08	0.35E-01	10					
1428	1132	3.58	0.30E-02	10					
1428	1145	1.58	0.35E-02	10					

CONFIGURATION

DUAL SPACE, DUAL FREQUENCY, DUAL ANGLE

DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1222	1158	1.10	0.39E-03	20
1222	1244	0.85	0.35E-03	20
1222	1305	0.13	0.30E-03	20
1222	1328	4.22	0.10E-03	20
1222	1349	5.97	0.12E-03	20
1222	1410	6.85	0.11E-03	20
1330	1156	12.67	0.23E-07	20
1330	1303	11.92	0.22E-07	20
1330	1326	10.92	0.54E-07	20
1330	1347	8.67	0.59E-06	20
1330	1520	13.05	0.12E-07	20
1330	1541	14.82	0.93E-08	20
1401	1035	7.17	0.13E-04	20
1413	1511	3.82	0.71E-04	20
1413	1523	5.06	0.17E-04	20
1413	1545	5.18	0.31E-04	20
1413	1612	4.81	0.31E-04	10
1414	1006	3.33	0.12E-03	20
1414	1029	2.58	0.27E-03	20
1414	1051	2.57	0.22E-03	20
1414	1115	2.10	0.50E-03	20
1414	1352	2.83	0.26E-03	20
1414	1415	3.07	0.10E-03	20
1414	1510	3.68	0.63E-04	10
1414	1522	2.34	0.21E-03	20
1414	1551	2.43	0.10E-03	20
1414	1615	3.68	0.53E-04	10
1415	1418	7.55	0.33E-04	20
1415	1450	8.05	0.20E-05	20
1415	1510	7.67	0.21E-05	20
1415	1605	7.55	0.57E-06	20
1416	1011	1.47	0.33E-02	20
1416	1126	1.96	0.51E-03	20
1416	1201	2.33	0.62E-03	20
1416	1511	10.30	0.64E-07	20
1416	1532	9.05	0.87E-07	20
1416	1554	10.05	0.38E-07	20
1417	1125	12.30	0.56E-08	20
1417	1229	13.30	0.88E-08	20
1421	1545	3.08	0.13E-03	20
1422	1027	0.24	0.32E-01	20
1422	1155	0.49	0.54E-01	20
1423	1210	8.06	0.26E-05	20
1423	1232	7.57	0.41E-05	20
1423	1255	5.07	0.78E-04	20
1423	1325	3.59	0.13E-03	20
1423	1348	3.19	0.24E-03	20
1423	1458	3.92	0.11E-03	20
1424	1137	6.17	0.14E-04	20
1425	1213	0.37	0.40E-02	20
1425	1230	0.48	0.11E-01	20
1426	1113	0.37	0.83E-02	20
1426	1243	2.09	0.10E-02	20
1426	1305	2.09	0.80E-03	20
1426	1423	3.09	0.31E-03	20
1427	1134	5.17	0.18E-04	20

		CONFIGURATION			CONFIGURATION		
		DUAL SPACE, DUAL FREQUENCY			DUAL SPACE, DUAL ANGLE, 4.50 GHZ		
DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1222	1432	8.47	0.38E-03	20	8.22	0.20E-03	20
1327	1045	1.08	0.32E-01	20	1.50	0.16E-01	20
1327	1100	0.58	0.58E-01	10	1.00	0.26E-01	10
1327	1113	0.58	0.99E-01	10	0.50	0.11E-01	10
1330	1435	14.58	0.34E-06	20	12.75	0.14E-04	20
1330	1458	14.08	0.86E-06	20	11.75	0.15E-04	20
1414	1140	3.00	0.45E-02	20	2.38	0.84E-02	20
1414	1228	2.17	0.83E-02	20	2.38	0.82E-02	20
1414	1328	2.67	0.70E-02	20	3.63	0.43E-02	20
1416	1330	7.50	0.24E-03	20	5.38	0.11E-02	20
1416	1405	9.08	0.32E-04	20	9.50	0.83E-04	20
1416	1427	9.83	0.12E-04	20	10.50	0.42E-04	20
1416	1449	9.58	0.19E-04	20	8.75	0.23E-04	20
1417	1100	15.08	0.32E-06	20	14.00	0.10E-05	20
1417	1300	15.08	0.68E-06	20	15.50	0.39E-06	20
1423	1412	5.83	0.15E-02	20	2.75	0.14E-01	20
1423	1435	4.08	0.28E-02	20	1.63	0.16E-02	20
1424	1115	7.33	0.40E-03	20	3.75	0.88E-02	20
1425	1121	6.17	0.30E-01	20	0.13	0.58E-01	20
1425	1145	0.13	0.49E-01	10	0.13	0.57E-01	10
1425	1200	0.13	0.50E-01	10	0.13	0.44E-02	10
1426	1136	3.10	0.51E-02	20	1.38	0.35E-01	20
1426	1150	3.83	0.36E-02	10	1.75	0.26E-01	10
1426	1202	3.58	0.36E-02	10	1.50	0.22E-01	10
1426	1214	4.08	0.31E-02	10	2.00	0.19E-01	10
1426	1230	4.33	0.32E-02	10	2.25	0.16E-01	10
1426	1445	4.33	0.31E-02	20	2.25	0.28E-01	20

		CONFIGURATION			CONFIGURATION		
		DUAL SPACE, DUAL FREQUENCY			DUAL SPACE, DUAL FREQUENCY, DUAL ANGLE		
DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1222	1158	1.72	0.49E-02	20	1.10	0.39E-03	20
1222	1244	1.72	0.47E-02	20	0.85	0.35E-03	20
1222	1305	2.72	0.34E-02	20	0.13	0.30E-03	20
1222	1328	5.47	0.82E-03	20	4.22	0.10E-03	20
1222	1349	6.72	0.68E-03	20	5.97	0.12E-03	20
1222	1410	7.47	0.56E-03	20	6.85	0.11E-03	20
1330	1156	13.33	0.23E-05	20	12.67	0.23E-07	20
1330	1303	13.08	0.28E-05	20	11.92	0.22E-07	20
1330	1326	12.58	0.12E-05	20	10.92	0.54E-07	20
1330	1347	11.08	0.39E-04	20	8.67	0.59E-06	20
1330	1520	15.83	0.16E-06	20	13.05	0.12E-07	20
1330	1541	17.83	0.58E-07	20	14.82	0.93E-08	20
1401	1035	8.83	0.36E-03	20	7.17	0.13E-04	20
1413	1511	3.42	0.48E-02	20	3.82	0.71E-04	20
1413	1523	4.25	0.26E-02	20	5.06	0.17E-04	20
1413	1545	5.00	0.20E-02	20	5.18	0.31E-04	20
1413	1612	4.00	0.42E-02	10	4.81	0.31E-04	10
1414	1006	4.75	0.14E-02	20	3.33	0.12E-03	20
1414	1029	4.25	0.23E-02	20	2.58	0.27E-03	20
1414	1051	4.00	0.22E-02	20	2.57	0.22E-03	20
1414	1115	3.50	0.40E-02	20	2.10	0.50E-03	20
1414	1352	2.92	0.61E-02	20	2.83	0.26E-03	20
1414	1415	2.92	0.46E-02	20	3.07	0.10E-03	20
1414	1510	3.75	0.22E-02	10	3.68	0.63E-04	10
1414	1522	3.42	0.26E-02	20	2.34	0.21E-03	20
1414	1551	3.75	0.15E-02	20	2.43	0.10E-03	20
1414	1615	4.50	0.11E-02	10	3.68	0.53E-04	10

		CONFIGURATION			CONFIGURATION		
		DUAL SPACE, DUAL FREQUENCY			DUAL SPACE, DUAL FREQUENCY, DUAL ANGLE		
DATE	TIME	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)	SNR (DB)	BIT ERROR RATE	TEST LENGTH (MINUTES)
1415	1418	8.33	0.26E-03	20	7.55	0.33E-04	20
1415	1450	9.08	0.67E-04	20	8.05	0.20E-05	20
1415	1510	9.08	0.45E-04	20	7.67	0.21E-05	20
1415	1605	7.83	0.10E-03	20	7.55	0.57E-06	20
1416	1011	2.67	0.91E-02	20	1.47	0.33E-02	20
1416	1126	3.42	0.14E-02	20	1.96	0.51E-03	20
1416	1201	2.92	0.63E-02	20	2.33	0.62E-03	20
1416	1511	9.58	0.20E-04	20	10.30	0.64E-07	20
1416	1532	9.08	0.31E-03	20	9.05	0.87E-07	20
1416	1554	8.58	0.50E-03	20	10.05	0.38E-07	20
1417	1125	15.83	0.79E-07	20	12.30	0.56E-08	20
1417	1229	15.08	0.74E-07	20	13.30	0.88E-08	20
1421	1545	6.08	0.50E-03	20	3.08	0.13E-03	20
1422	1027	0.58	0.59E-01	20	0.24	0.32E-01	20
1422	1155	1.08	0.12E+00	20	0.49	0.54E-01	20
1423	1210	14.58	0.59E-05	20	8.06	0.26E-05	20
1423	1232	13.33	0.92E-05	20	7.57	0.41E-05	20
1423	1255	9.83	0.16E-03	20	5.07	0.78E-04	20
1423	1325	7.58	0.36E-03	20	3.59	0.13E-03	20
1423	1348	6.58	0.11E-02	20	3.19	0.24E-03	20
1423	1458	5.83	0.12E-02	20	3.92	0.11E-03	20
1424	1137	7.58	0.27E-03	20	6.17	0.14E-04	20
1425	1213	0.13	0.22E-01	20	0.37	0.40E-02	20
1425	1230	0.37	0.91E-01	20	0.48	0.11E-01	20
1426	1113	0.73	0.21E-01	20	0.37	0.83E-02	20
1426	1243	4.58	0.22E-02	20	2.09	0.10E-02	20
1426	1305	4.58	0.22E-02	20	2.09	0.80E-03	20
1426	1423	6.58	0.75E-03	20	3.09	0.31E-03	20
1427	1134	7.08	0.35E-03	20	5.17	0.18E-04	20

APPENDIX H

SYLVANIA MDTS MAINTENANCE TRIP REPORT

MDTS 647-265

INTER OFFICE

GTE SYLVANIA

Electronic Systems Group
Eastern Division
77 "A" Street
Needham Heights, Mass. 02194
617 449-2000

SUB / DATE: MDTS Maintenance Trip Report
3/30/78 - 3/31/78; Verona, New York — 3 April 1978

TO: D. Kern — cc: V. Ellins (2)
C.Grossman -647 Bldg.10
Dr.P.Monsen
Signatron, Inc.

FROM: L. Wetmore

The purpose of this trip was to determine the cause of failure of MDTS Serial Number 003, and return it to service. This modem was set up at 12 MB/Sec and would not synchronize when connected in a back-to-back configuration. Apparently this modem and modem SN 008 had both been set up at 12 MB/Sec and had both been successfully checked out on the RADC Simulator at Verona. Subsequently, SN003 failed. John Eschle of Signatron was the test operator.

Initial examination of SN 003 indicated that the analog eye pattern was completely collapsed. All circuit cards were checked for correct data rate components and Strap Settings. All cables in the back of the nest were checked. An intermittent cable was discovered and repaired. This cable went between the FES and FED. The intermittency only appeared under great stress and was not a contributing factor to the problem at hand. Finally, at the suggestion of Pete Monsen, I performed the "collapsed eye test" and the results indicated that the system phasing was not properly aligned. I immediately suspected that the MBC card, which

contains a length of trimmed cable, had been swapped with another modem. Within a few minutes it was determined which MBC cards belonged where. Two 20 minute data points were taken using each of the 12 MB/Sec modems on the simulator. The resulting bit error rates were very close and they also tracked the data that had been previously taken on these two modems. Both modems were then subjected to on-the-air link tests and,again, the results showed that the modems were tracking each other very well. The on-the-air data points were two orders of magnitude poorer than the desired results. However, as both modems performed well on the simulator, and tracked each other both on the simulator and on the live link, it was decided that the poor on-the-air performance was not related to a malfunctioning modem, but rather to some link parameter. John Eschle was convinced that the modems were operating normally and he would continue the investigation to determine the cause of the degraded performance.

L. Wetmore

L. Wetmore

reg

APPENDIX I

SIGNATRON MONTHLY STATUS REPORT #23

SIGNATRON®
SIGNATRON, Inc. · 12 Hartwell Avenue · Lexington, Massachusetts 02173
(617)861-1500

Monthly Status Report #23 A212

ADAPTIVE ANTENNA CONTROL

DAAB07-76-C-8085

Prepared by: P. Monsen, Program Manager
Date: 5 June 1978

Work accomplished during the period from 1 May 1978 through 31 May 1978 is summarized. Also included in this report is the Contractor Cost Correlation Data for the reported period.

The angle diversity test program was completed as of 26 May. An earlier problem resulting in significant degradation in the 2S/2F baseline system was partially resolved early in the month. Enclosures 1 and 2 provide the reports of Dr. Ehrman of Signatron and Mr. Wetmore of Sylvania relative to the problem. Although no problem area was specifically identified during their investigation, the site engineer, Mr. Mangold, discovered a faulty cable connecting to the transmitter shortly after their visit. After cable replacement, the BER measured at Verona no longer exhibited the scatter present in previous baseline tests at 12 Mb/s. A fixed degradation of about 3 dB from previous MDTS tests was still present however. This degradation is consistent with the transmitter degradation measured by Dr. Ehrman, c.f. Fig. 3, enclosure 1. We do not have a satisfactory explanation of why previous 12 Mb/s MDTS tests using the same transmitters were 3 dB better.

Preliminary analysis of the 12 Mb/s shows similar results to the 6 Mb/s tests, viz., approximately equal performance of the 2S/2F and 2S/ZA configurations and no serious sensitivity to delay variations between angle diversity beams. The multi-path spread in the elevated beams did not present an intersymbol interference problem for the MDTS equalizer.

A technical briefing of our preliminary angle diversity results took place on 2 May at the SHAPE Technical Center in the Hague, Netherlands. Briefings were provided by Mr. Osterholz of DCEC, Mr. Krause of CORADCOM, and Dr. Monsen of Signatron.

TO: P. Monsen DATE: May 12, 1978

FROM: L. Ehrman

SUBJECT: Radio/Modem Testing at Youngstown
May 10-11, 1978

As requested, I went to Youngstown on May 10/11 to run loopback tests on the MDTS and the AN/TRC-132A. Larry Whetmore of Sylvania accompanied me.

On May 10 we measured the exciter and PA spectra, when driven by a 12 Mbps output from the mini-modulator. Photographs are shown in Figures 1 and 2. The exciter outputs, Figure 1(a) and (b), are identical. The PA outputs, Figure 2(a) and (b), shows that the 4500 MHz radio has a somewhat narrower bandwidth. The modulator outputs were looked at in the time domain, and appeared to be quite good -- nearly flat, and no apparant ripple. An RF loopback test was run from the 4690 MHz exciter output to the 4690 receiver. It was approximately 5 dB degraded from a theoretical CPSK curve, but I don't have too much confidence in the calibration accuracy.

The next morning RF loopback tests were run from the PA output. These tests can be considered accurate, as I have more faith in the calibration and we also, as will be seen, cross-checked against the SNR meter on the MDTS. Three tests were run. In the first two the MDTS was looped back at 4690 MHz and 4500 MHz, using the mini-modulator. In the last, a 4500 MHz loopback was run, using the MDTS modulator. The raw data are shown in Table 1. The "Alfred Attenuator" is a variable attenuator which was used to change the RSL. All tests were run with approximately 1 watt output from the 10 KW klystrons in order to reduce RF leakage to an acceptable level.

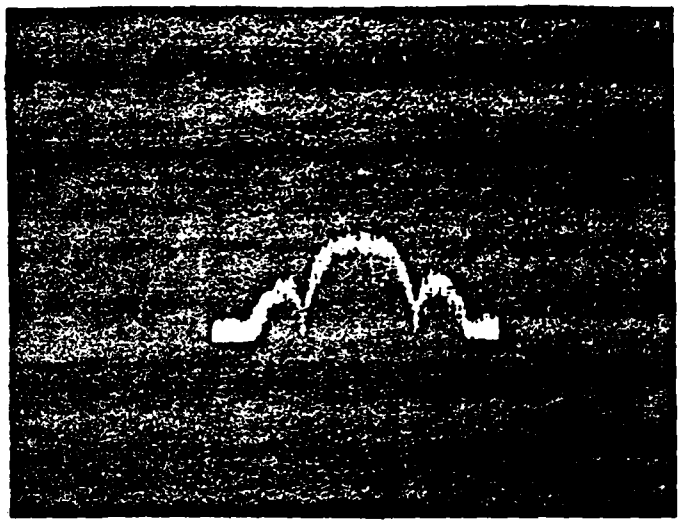


Figure 1(a) 4500 MHz Exciter Output

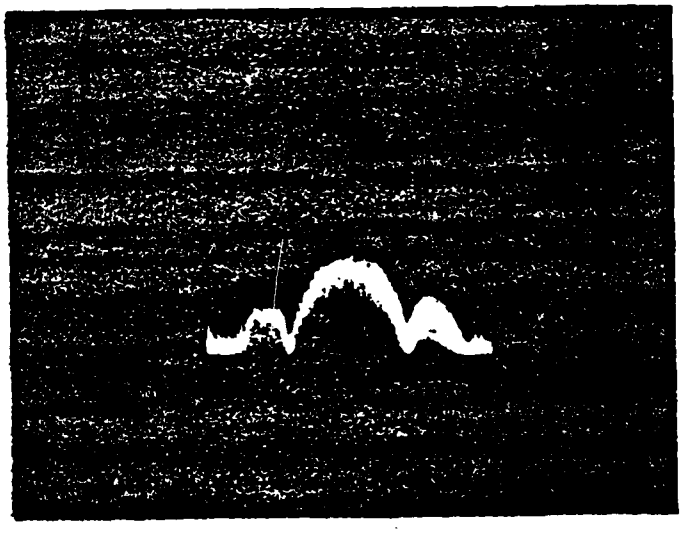


Figure 1(b) 4690 MHz Exciter Output

FIGURE 1 Exciter Outputs 3 MHz/cm, 10 dB/cm

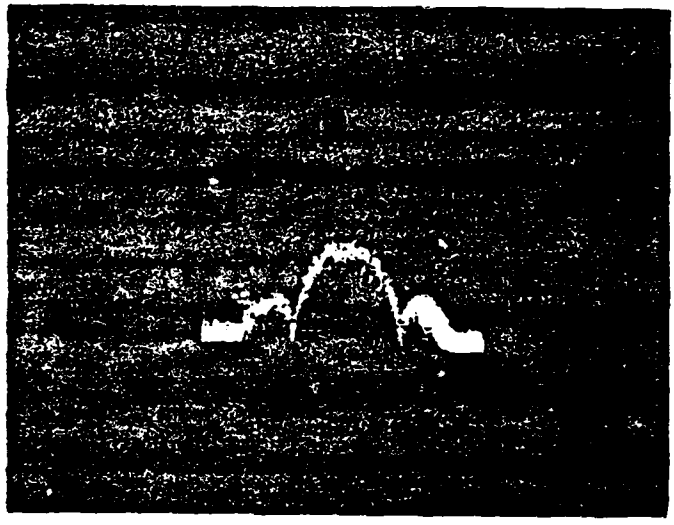


Figure 2(a) 4500 MHz Power Amplifier Output

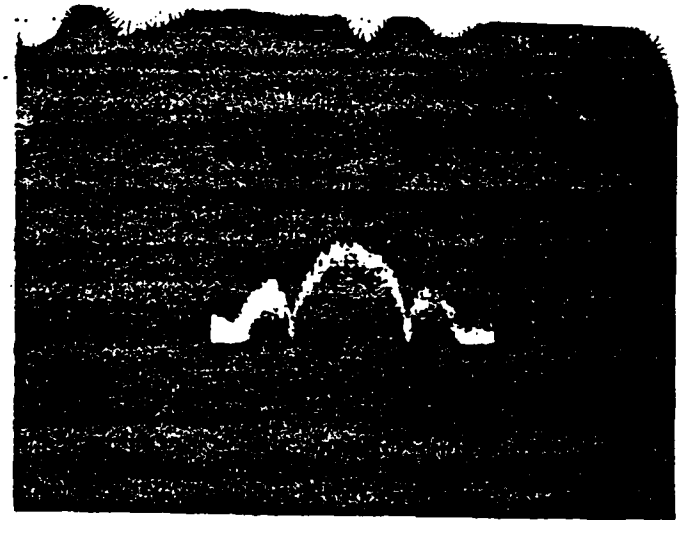


Figure 2(b) 4690 MHz Power Amplifier Output

FIGURE 2 Power Amplifier Outputs 3 MHz/cm, 10 dB/cm

TABLE 1

RF LOOPBACK TEST DATA

Alfred Atten(dB)	RSL (dBm)	SNR (f=5 dB)	Test 1 4690 MHz MDTS SNR	Test 1 4690 MHz P_e	Test 2 4500 MHz MDTS SNR	Test 2 4500 MHz P_e	Test 3 4500 MHz MDTS snr	Test 3 4500 MHz P_e
0	-80.6	21	-		-		20	3.2×10^{-1}
2	-82.6	19	-		-		20	7.0×10^{-1}
4	-84.6	17	18.5	4.8×10^{-7}	19.5	6.6×10^{-6}	18.0	2.4×10^{-1}
6	-86.6	15	16.5	2.0×10^{-5}	17.5	8.1×10^{-5}	16.5	1.0×10^{-1}
8	-88.6	13	13.5	3.0×10^{-4}	13	6.9×10^{-4}	13.0	6.6×10^{-1}
10	-90.6	11	10.5	2.8×10^{-3}	10	6.7×10^{-3}	10.0	5.9×10^{-3}
12	-92.6	9	8.5	1.3×10^{-2}	8.0	2.9×10^{-2}	-	-
14	-94.6	7	6.5	3.8×10^{-2}	6.0	7.5×10^{-2}	-	-
16	-96.6	5	4.5	9.5×10^{-2}	4.0	1.5×10^{-1}	-	-

NOTE: Tests 1 and 2 used minimodulator

Test 3 used MDTS modulator

All tests run with 1W PA Output

5 dB Noise figure Assumed.

In Table 1 we have converted RSL to SNR assuming a 5 dB noise figure, using the equation

$$SNR = RSL + 1.6\ (Nf + 10 \log R_b - 174)$$
$$= RSL + 98.6 \text{ @ } 12.6 \text{ Mbps, } f = 5 \text{ dB.}$$

An examination of the "MDTS SNR" column of Table 1 shows that in the 5 to 11 dB range, where the SNR meter is supposed to be most accurate (it is calibrated at 10 dB)the SNR derived from computation using the attenuator setting is in agreement with the MDTS SNR meter to within 1 dB, with the computed SNR being the higher.

The experimental data of Table 1 are plotted in Figure 3. It is seen that the 4500 MHz data are about 1 dB poorer than the 4690 MHz data, which in turn is about 5 dB poorer than theoretical. According to John Eschle, simulator testing of the modem on a non-fading channel showed a 3.5-4 dB degradation from theoretical. Therefore our experimental data indicate the radio further degrades performance by 1-1.5 dB, if a 1 dB calibration error exists, this reduces to 0-0.5 dB. The separation between the 4500 MHz tests using the mini-modulator (Test 2) and the MDTS modulator (Test 3) is real, and appears to be due to a nonlinearity in the MDTS modulator.

To sum up, the Verona link looks good. It is possible that the PA will degrade at high powerlevel. Don Mangold states, however, that he has measured the bandwidth at full output power, and it does not change from the low level value. It is therefore an unlikely source of further degradation.

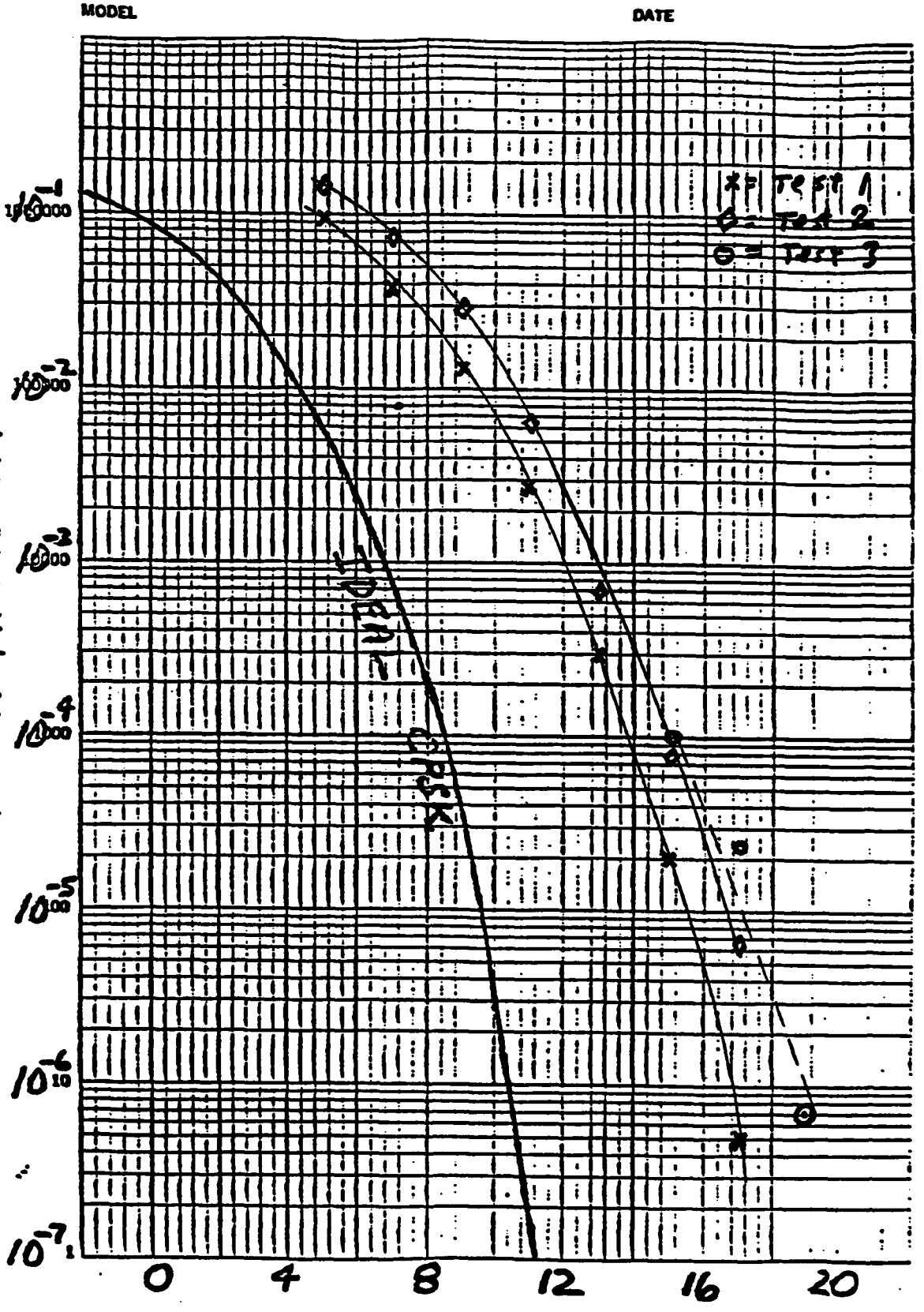


Fig 3. Experimental RF Loopback Results

MDTS647-269

GTE SYLVANIA INCORPORATED

Electronic Systems Group
Communication Systems Division
189 "B" Street
Needham Heights, Mass. 02194
617 449-2000

15 May 1978

SUB./DATE: MDTS Maintenance Trip Report
5/10/78 - 5/11/78

TO: D. Kern

cc: V. Ellins
C. Grossman
P. Monsen, Signatron

From: L. Wetmore

The purpose of this trip was to attempt to determine the reason for the degraded MDTS system performance at 12MB/S. Dr. Len Ehrman and I arrived at the Youngstown site Wednesday morning. An MDTS modem (SN008) set at 12 MB/S and some miscellaneous test equipment had arrived from the Verona test site, via truck, to enable us to perform IF and RF loop back tests. The Sylvania Minimodulator had been performing as the modulator at Youngstown.

An IF loopback was performed at 70 MHz between the minimodulator and the MDTS. The SDS bit error rate test verified that no errors were generated, hence the minimodulator was not creating any irreducible error rate. RF loop back tests were performed at both 4500 GHz and 4690 GHz using a pair of receivers shipped from Verona. Establishing accurate calibration levels was difficult due to the field environment, however, we were able to show that the E_b/N_o curve at 4690 was about 1 db better than at 4500 GHz. The curves were about 4 db off the theoretical. Experimental results from Verona had indicated that the 4690 GHz data was noticeably better than 4500 GHz data. A 1 db degradation is not significant enough to cause the differences observed. The MDTS modulator was substituted for the minimodulator and E_b/N_o data was taken at 4500 GHz. This data was degraded by about 1 db at high SNR but fell in line with previous data at low values of SNR. This delta was verified to be the result of a TSC in the modem and an XSC (improved TSC) in the minimodulator. If the minimodulator had been contributing to any irreducible error rate, the observed results of this test would have indicated the MDTS modulator to be superior to the minimodulator, however, this was not the case.

Photographs of the QPSK spectrum at both exciter outputs and power amplifier outputs, at both frequencies, were taken. Dr. Erhman has the photographs and the recorded Bit Error Rate data.

Our final conclusion was that there was nothing occurring at the Youngstown site that would cause the performance degradation observed in Verona, at 12MB/S.

We departed the site Thursday afternoon, May 11,1978.

Lawrence C. Wetmore
L. Wetmore

reg

APPENDIX J

AAC RELIABILITY ANALYSIS

APPENDIX

AAC Reliability Analysis

This appendix documents the results for the final realiability assessment consisting of a detailed reliability prediciton and mathematical model based on MIL-HDBK-217C, Reliability of Electronic Equipment, 9 April 1979.

The AAC model in the quadruple diversity application consists of two dual polarized double feedhorns, spar modifications for feedhorn mounting, and additional waveguide for the elevated beam received signals. The results of the AAC program show that conversion from frequency diversity systems to the above AAC angle diversity model realizes a 2:1 decrease in bandwidth occupancy with approximately the same or better performance. Because the AAC model for this conversion is non electronic, the impact on reliability on the existing system is negligible. The major failure mode for feedhorns is the probability of pressure loss in the guide accompanied by water leadage and resultant corrosion. Good maintenance practices should make such eventualities much less likely than electronic failure. Furthermore, mathematical models and statistical data for feedhorn failure do not exist at a level for accurate reliability prediction.

An extended angle diversity system has also been included in the AAC model for those applications where conversion from fourth to eighth order diversity is recommended. However, the AAC program results show that the improvement for such conversion a Predetection Combiner (PDC) is used to combine the additional four diversities. The prototype PDC used in the AAC tests is now obsolete as it was designed to operate with the original MD-918 modem. Subsequent simplifications in the MD-918 would now require redesign of the PDC for proper interface. For completeness, however, the reliability calculation for this

equipment has been performed using the SIGNATRON Reliability Prediciton model. This model is based on MIL-HDBK-217C. In the model, the reliability of each component is computed using part quality data, use environment data, a failure rate model and thermal considerations. These factors are briefly summarized before presenting the reliability results.

A.1 Part Quality

The quality of a part has a direct effect on the part failure rate and appears in the part models as a factor, π_Q. Many parts are covered by specifications that have several quality levels, hence the part models have values of π_Q that are keyed to these quality levels. Such parts with their quality designators are shown in Table A-1. The detailed requirements for these levels are clearly defined in the applicable specification.

TABLE A-1 PARTS WITH MULTI-LEVEL QUALITY SPECIFICATIONS

PART	QUALITY DESIGNATORS
Microelectronics	S, B, B-1, B-2, C, C-1, D, D-1
Discrete Semiconductors	JANTXV, JANTX, JAN
Capacitors, Established Reliability (ER)	L, M, P, R, S
Resistors, Established Reliability (ER)	M, P, R, S
Coils, Molded, R.F., Established Reliability (ER)	M, P, R, S
Relays, Established Reliability (ER)	L, M, P, R

Some parts are covered by older specifications, usually referred to as Non-ER, that do not have multi-levels of quality. These part models generally have two quality levels designated as "MIL Spec.", and "Lower". If the part is procured in complete accordance with the applicable specification, π_Q value for Mil Spec.

should be used. If any requirements are waived, or if a commercial part is procured, the π_Q value for Lower should be used.

A.2 Use Environment

All part reliability models include the effects of environmental stresses through the factor, π_E. The definitions of these environments are shown in Table A.2. The π_E factor is quantified within each part failure rate model. These environments encompass the major areas of equipment use. Some equipment may experience more than one environment during its normal use, e.g., equipment in spacecraft. In such a case, the reliability analysis should be segmented, namely, missile launch (M_L) conditions during boost and return from orbit, and space flight (S_F) while in orbit.

TABLE A-2

ENVIRONMENTAL SYMBOL IDENTIFICATION AND DESCRIPTION

ENVIRONMENT	π_E SYMBOL	NOMINAL ENVIRONMENTAL CONDITIONS
Ground, Benign	G_B	Nearly zero environmental stress with optimum engineering operation and maintenance.
Space, Flight	S_F	Earth orbital. Approaches Ground, Benign conditions without access for maintenance. Vehicle neither under powered flight nor in atmospheric re-entry.
Ground, Fixed	G_F	Conditions less than ideal to include installation in permanent racks with adequate cooling air, maintenance by military personnel and possible installation in unheated buildings.
Ground, Mobile	G_M	Conditions more severe than those for G_F, mostly for vibration and shock. Cooling air supply may also be more limited, and maintenance less uniform.

ENVIRONMENT	π_E SYMBOL	NOMINAL ENVIRONMENTAL CONDITIONS
Naval, Sheltered	N_S	Surface ship conditions similar to G_F but subject to occasional high shock and vibration.
Naval, Unsheltered	N_U	Nominal surface shipborne conditions but with repetitive high levels of shock and vibration.
Airborne, Inhabited, Transport	A_{IT}	Typical conditions in transport or bomber compartments occupied by aircrew without environmental extremes of pressure, temperature, shock and vibration, and installed on long mission aircraft such as transports and bombers.
Airborne, Inhabited Fighter	A_{IF}	Same as A_{IT} but installed on high performance aircraft such as fighters and intercepters.
Airborne, Uninhabited, Transport	A_{UT}	Bomb bay, equipment bay, tail, or wing installations where extreme pressure, vibration, and temperature cycling may be aggravated by contamination from oil, hydraulic fluid and engine exhaust. Installed on long mission aircraft such as transports and bombers.
Airborne, Uninhabited, Fighter	A_{UF}	Same as A_{UT} but installed on high performance aircraft such as fighters and intercepters.
Missile, Launch	M_L	Severe conditions of noise, vibration, and other environments related to missile launch, and space vehicle boost into orbit, vehicle re-entry and landing by parachute. Conditions may also apply to installation near main rocket engines during launch operations.

A.3 Part Failure Rate Models

Part failure rate models for microeelectronic parts are significantly different from those for other parts and require a special model. Another type of model is used on most other parts; a typical example is the following one for discrete semiconductors:

$$\lambda_p = \lambda_b \ (\pi_E \times \pi_A \times \pi_{S2} \times \pi_C \times \pi_Q)$$

where λ_p is the part failure rate,

λ_b is the base failure rate usually expressed by a model relating the influence of electrical and temperature stresses on the part,

π_E and the other π factors modify the base failure rate for the category of environmental application and other parameters that affect the part reliability.

The base failure rate (λ_b) models are based on MIL-HDBK-217C. The model equations have been incorporated into our computer program for machine processing. The tabulated values of λ_b are cut off at the part ratings with regard to temperature and stress, hence, use of parts beyond these cut off points will overstress the part. The use of the λ_b models in the computer program takes the part rating limits into account. The λ_b equations are mathematically continuous beyond the part ratings but such failure rate values are invalid in the overstressed regions.

A.4 Thermal Aspects

The use of this prediction method requires the determination of the temperatures to which the parts are subjected. Since parts reliability is sensitive to temperature, the thermal analysis of any design should fairly accurately provide the ambient temperatures needed in using the part models.

The ambient temperature TA in °C is used by the model in this calculation.

A.5 PDC Reliability

The reliability analysis for each card of the PDC is presented in the following tables. These tables include cost data on individual components. The part reliability (LAMDA) and the group failure rate (GFR) are expressed as the average number of failures in 10^6 hours. At the end of the individual card summaries, the failure rate for the entire system is computed.

RAM ANALYSIS

PROCESSOR CARD MODIFIED 212-2-006

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
R	RC07	0.25	0.10	0.8200E+01	RC	5.0
R	RL07	0.25	0.10	0.1500E+03	RL	1.0
R	RL07	0.25	0.10	0.5100E+02	RL	1.0
R	RL07	0.25	0.10	0.1500E+04	RL	1.0
R	RJ24FP-X	0.50	0.10	0.1000E+04	RJ	2.0
R	RL07	0.25	0.10	0.1000E+04	RL	1.0
R	RL07	0.25	0.10	0.2700E+03	RL	1.0
R	RN55	0.12	0.10	0.1050E+03	RN	1.0
R	RN55	0.12	0.10	0.3830E+06	RN	1.0
R	RJ24CP-X	0.50	0.10	0.1000E+06	RJ	2.0
R	RC07	0.25	0.10	0.2000E+04	RC	5.0
R	RN55	0.12	0.10	0.1470E+05	RN	1.0
R	RN55	0.12	0.10	0.5110E+04	RN	1.0
R	RN55	0.12	0.10	0.9530E+04	RN	1.0
R	RN55	0.12	0.10	0.2870E+05	RN	1.0
R	RL07	0.25	0.10	0.3300E+04	RL	1.0
R	RL07	0.25	0.10	0.6800E+02	RL	1.0
R	RN55	0.12	0.10	0.1330E+05	RN	1.0
R	RN55	0.12	0.10	0.7500E+05	RN	1.0
R	RL07	0.25	0.10	0.1800E+03	RL	1.0
C	JMC-9321	750.00	0.10	0.1000E-04	CV	20.0
C	CM05F-X	500.00	0.10	0.2000E-03	CM	10.0
C	CM06F-X	500.00	0.10	0.2200E-02	CM	10.0
C	CK06BX-X	100.00	15.00	0.1000E+00	CK	10.0
C	TRWX440	50.00	15.00	0.1500E-01	CQ	10.0
C	401EC0050AD-X	0.00	0.10	0.5600E-03	CC	15.0
C	CM05C-X	500.00	0.20	0.6000E-05	CM	10.0
C	CSR13F-X-S	35.00	15.00	0.6800E+01	CSR	1.5
C	CK05BX-X	200.00	10.00	0.1000E-02	CK	10.0
L	B-X-P	750.00	60.00	0.4700E+00	IND	0.0
L	B-X-P	750.00	60.00	0.4700E+01	IND	0.0
CR	A5X671	0.00	10.00	0.1000E+01	72	0.0
U	AD518S/883	15.00	15.00	0.4600E+02	LIN	150.0
U	RB741T	22.00	15.00	0.2300E+02	LIN	150.0
HY	FP-J4-100-70	0.00	0.00	0.0000E+00		0.0
HY	TO-HJ-302SP	0.00	0.00	0.0000E+00		0.0
HY	CSB-100P	0.00	0.00	0.0000E+00		0.0
HY	TO-HC-127	0.00	0.00	0.0000E+00		0.0
E	700303	750.00	3.00	0.1000E+01		
E	700056	750.00	3.00	0.1000E+01		
E	DM-53740-5001	1000.00	3.00	0.1000E+01		
E	DBM-25PF	1000.00	15.00	0.2500E+02		

PROCESSOR CARD MODIFIED 212-2-006

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	6.48	0.71984E-02	72	0.48949E+00
R	RL07	21.60	0.75258E-02	240	0.19146E+01
R	RJ24FP-X	120.00	0.41152E+01	48	0.19753E+03
R	RN55	36.96	0.12520E-01	336	0.42970E+01
R	RJ24CP-X	2.64	0.53497E+01	24	0.12839E+03
C	JMC-9321	46.80	0.15390E+00	24	0.36937E+01
C	CM05F-X	12.00	0.44026E-02	24	0.10566E+00
C	CM06F-X	12.00	0.44026E-02	24	0.10566E+00
C	CK06BX-X	134.40	0.84679E-01	192	0.16258E+02
C	TRWX440	40.32	0.29845E-02	24	0.71627E-01
C	401EC0050AD-X	360.00	0.32452E-01	48	0.15577E+01
C	CM05C-X	12.00	0.44026E-02	24	0.10566E+00
C	CSR13F-X-S	10.56	0.48629E-01	24	0.11671E+01
C	CK05BX-X	12.00	0.75619E-01	24	0.18149E+01
L	B-X-P	34.08	0.00000E+00	48	0.00000E+00
CR	A5X671	141.60	0.00000E+00	48	0.00000E+00
U	AD518S/883	430.80	0.37083E+01	24	0.88998E+02
U	RB741T	105.60	0.23223E+01	48	0.11147E+03
HY	FP-J4-100-70	840.00	0.10000E-01	24	0.24000E+00
HY	TO-HJ-302SP	168.00	0.10000E-01	12	0.12000E+00
HY	CSB-100P	240.00	0.10000E-01	12	0.12000E+00
HY	TO-HC-127	336.00	0.10000E-01	24	0.24000E+00
E	700303	90.00	0.31966E-01	12	0.38359E+00
E	700056	90.00	0.31966E-01	12	0.38359E+00
E	DM-53740-5001	573.12	0.31966E-01	48	0.15344E+01
E	DBM-25PF	211.20	0.15268E+00	12	0.18322E+01
	TOTALS	4088.16		1452	0.56282E+03

RAM ANALYSIS

PDC 212-1-001

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
HY	OHJ-3044	0.00	0.00	0.0000E+00		0.0
DS	5082-4955	1.60	1.60	0.0000E+00	100	0.0
DS	5082-4650	1.60	1.60	0.0000E+00	100	0.0
M	17446	0.00	0.00	0.0000E+00		0.0
S	PA-1015	5.50	0.00	0.0000E+00		0.0
S	PA-1005	5.50	0.00	0.0000E+00		0.0
S	MPG-106F	6.00	0.00	0.0000E+00		0.0
R	RC07	0.25	0.10	0.1000E+05	RC	5.0
R	RC07	0.25	0.10	0.2000E+03	RC	5.0
CR	1N759A	12.00	12.00	0.1000E+01	50	0.0
E	819-B3800-B-75	1500.00	4.00	0.1000E+01		
E	OSM-511-3	1000.00	4.00	0.1000E+01		

PDC 212-1-001

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	0.36	0.71984E-02	4	0.23995E-01
HY	OHJ-3044	282.00	0.10000E-01	6	0.60000E-01
DS	5082-4955	1.00	0.20000E+00	1	0.20000E+00
DS	5082-4650	2.00	0.20000E+00	2	0.40000E+00
M	17446	40.00	0.10000E+02	1	0.10000E+02
S	PA-1015	5.69	0.00000E+00	1	0.00000E+00
S	PA-1005	5.69	0.00000E+00	1	0.00000E+00
S	MPG-106F	2.50	0.00000E+00	1	0.00000E+00
CR	1N759A	0.70	0.00000E+00	1	0.00000E+00
E	819-B3800-B-75	45.00	0.31966E-01	12	0.38359E+00
E	OSM-511-3	135.00	0.31966E-01	30	0.95898E+00
	TOTALS	519.94		60	0.12027E+02

RAM ANALYSIS

ADAPTIVE COMBINER AMPLIFIER 212-2-005

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
E	DBM-25PF	1000.00	24.00	0.2500E+02		
R	RL07	0.25	0.10	0.2700E+02	RL	1.0
R	RL07	0.25	0.10	0.3000E+02	RL	1.0
C	CSR13F-X-M	35.00	24.00	0.2200E+02	CSR	1.5
C	CSR13F-X-M	35.00	24.00	0.6800E+01	CSR	1.5
C	CK05BX-X	200.00	24.00	0.4700E-03	CK	10.0
C	CK06BX-X	100.00	24.00	0.1000E+00	CK	10.0
C	JMC-9321	750.00	0.10	0.1000E-04	CV	20.0
L	WEE-X	750.00	60.00	0.4700E+01	IND	0.0
U	AH-4013	30.00	24.00	0.4600E+02	LIN	150.0
U	AH-52	30.00	24.00	0.4600E+02	LIN	150.0
E	DM-53740-5001	1000.00	4.00	0.1000E+01		

ADAPTIVE COMBINER AMPLIFIER 212-2-005

	PART NO.	COST	LAMDA P	QTY	GFR
R	RL07	0.81	0.75258E-02	9	0.81278E-01
C	JMC-9321	5.85	0.15390E+00	3	0.46171E+00
C	CK06BX-X	3.50	0.84679E-01	5	0.56905E+00
C	CK05BX-X	6.00	0.75619E-01	12	0.96105E+00
E	DM-53740-5001	71.64	0.31966E-01	6	0.19180E+00
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
C	CSR13F-X-M	5.00	0.13167E+00	5	0.65835E+00
L	WEE-X	23.28	0.00000E+00	12	0.00000E+00
U	AH-4013	420.00	0.37083E+01	3	0.11125E+02
U	AH-52	180.00	0.37083E+01	3	0.11125E+02
	TOTALS	733.68		59	0.25325E+02

RAM ANALYSIS

ADAPTIVE COMBINER INPUT 212-2-007

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
E	DBM-25PF	1000.00	24.00	0.2500E+02		
E	DM-53740-5001	1000.00	3.00	0.1000E+01		
E	7000310	750.00	0.10	0.1000E+01		
E	700056	750.00	0.10	0.1000E+01		
E	OSM-531-3	750.00	0.10	0.1000E+01		
R	RC07	0.25	0.10	0.1500E+02	RC	5.0
R	RC07	0.25	0.10	0.2000E+02	RC	5.0
R	RC07	0.25	0.10	0.3900E+02	RC	5.0
R	RC07	0.25	0.10	0.5100E+02	RC	5.0
R	RC07	0.25	0.10	0.1200E+03	RC	5.0
R	RC07	0.25	0.10	0.2000E+03	RC	5.0
R	RC07	0.25	0.10	0.1500E+03	RC	5.0
R	RC07	0.25	0.10	0.2400E+03	RC	5.0
R	RC07	0.25	0.10	0.3600E+03	RC	5.0
C	CK06BX-X	100.00	24.00	0.1000E+00	CK	10.0
C	CSR13F-X-R	35.00	24.00	0.2200E+02	CSR	1.5
C	CK05BX-X	200.00	24.00	0.4700E-03	CK	10.0
C	CSR13F-X-R	35.00	24.00	0.6800E+01	CSR	1.5
L	WEE-X	750.00	60.00	0.4700E+01	IND	0.0
U	AH-52	30.00	15.00	0.4600E+02	LIN	150.0
U	AHD-555	30.00	15.00	0.4600E+02	LIN	150.0
U	GPD-403	30.00	24.00	0.4600E+02	LIN	150.0
HY	R-HJ-304	0.00	0.00	0.0000E+00		0.0
HY	R-HJ-303L	0.00	0.00	0.0000E+00		0.0
DL	MCT-1000	0.00	0.10	0.0000E+00		0.0

ADAPTIVE COMBINER INPUT 212-2-007

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	1.26	0.71984E-02	14	0.88781E-01
C	CK06BX-X	4.20	0.84679E-01	6	0.68285E+00
C	CK05BX-X	4.00	0.75619E-01	8	0.64070E+00
E	700056	15.00	0.31966E-01	2	0.63932E-01
E	DM-53740-5001	83.58	0.31966E-01	7	0.22376E+00
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
L	WEE-X	17.46	0.00000E+00	9	0.00000E+00
U	AH-52	120.00	0.37083E+01	2	0.74165E+01
E	7000310	15.00	0.31966E-01	2	0.63932E-01
E	OSM-531-3	9.00	0.31966E-01	2	0.63932E-01
C	CSR13F-X-R	6.00	0.13167E+00	6	0.79002E+00
U	AHD-555	70.00	0.37083E+01	2	0.74165E+01
U	GPD-403	30.00	0.37083E+01	1	0.37083E+01
HY	R-HJ-304	39.00	0.10000E-01	1	0.10000E-01
HY	R-HJ-303L	44.00	0.10000E-01	1	0.10000E-01
DL	MCT-1000	1098.00	0.00000E+00	1	0.00000E+00
	TOTALS	1574.10		65	0.21332E+02

RAM ANALYSIS

ADAPTIVE COMBINER ERROR 212-2-008

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
E	DBM-25PF	1000.00	5.00	0.2500E+02		
E	DM-53740-5001	1000.00	3.00	0.1000E+01		
E	7000310	750.00	0.50	0.1000E+01		
HY	767	0.00	5.00	0.0000E+00		0.0
R	RN55D	0.12	0.10	0.6810E+02	RN	1.0
R	RL07	0.25	0.10	0.3000E+02	RL	1.0
R	RL07	0.25	0.10	0.1600E+02	RL	.0
R	RL07	0.25	0.10	0.5100E+02	RL	1.0
R	RL07	0.25	0.10	0.6800E+02	RL	1.0
R	RL07	0.25	0.10	0.1800E+03	RL	1.0
R	RL07	0.25	0.10	0.4700E+03	RL	1.0
R	RC07	0.25	0.10	0.1000E+04	RC	5.0
C	CK06BX-X	100.00	24.00	0.1000E+00	CK	10.0
C	CM05-X	500.00	0.30	0.1000E-04	CM	10.0
C	JMC-9322	750.00	0.30	0.2000E-04	CV	1.0
C	CSR13G-X-M	10.00	5.00	0.4700E+01	CSR	1.5
U	SN74S03	7.00	5.00	0.4000E+01	DIG	300.0
U	SN74S74	7.00	5.00	0.1200E+02	DIG	300.0
U	SN74S04	7.00	5.00	0.6000E+01	DIG	300.0
HY	TO-HJ-302SP	0.00	0.00	0.0000E+00		0.0
HY	R-HJ-303L	0.00	0.00	0.0000E+00		0.0
HY	TO-J4-70	0.00	0.00	0.0000E+00		0.0

ADAPTIVE COMBINER ERROR 212-2-008

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	0.18	0.71984E-02	2	0.11997E-01
R	RL07	2.97	0.75258E-02	33	0.27695E+00
C	CK06BX-X	10.50	0.84679E-01	15	0.17071E+01
HY	TO-HJ-302SP	42.00	0.10000E-01	3	0.30000E-01
E	DM-53740-5001	47.76	0.31966E-01	4	0.12786E+00
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
E	7000310	45.00	0.31966E-01	6	0.19180E+00
HY	R-HJ-303L	44.00	0.10000E-01	1	0.10000E-01
HY	767	105.00	0.10000E-01	6	0.60000E-01
R	RN55D	0.33	0.15024E-01	3	0.45073E-01
C	CM05-X	2.10	0.44026E-02	3	0.13208E-01
C	JMC-9322	2.10	0.76952E-02	3	0.23086E-01
C	CSR13G-X-M	1.95	0.64399E-01	1	0.64399E-01
U	SN74S03	13.68	0.20864E+01	3	0.62591E+01
U	SN74S74	21.93	0.31986E+01	3	0.95958E+01
U	SN74S04	5.41	0.24398E+01	1	0.24398E+01
HY	TO-J4-70	105.00	0.10000E-01	3	0.30000E-01
	TOTALS	467.51		91	0.21039E+02

RAM ANALYSIS

PCA AMPLIFIER 212-2-016

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
HY	GPD-402	24.00	15.00	0.4600E+02		150.0
HY	UTO-523	24.00	15.00	0.4600E+02		150.0
HY	UTO-505	24.00	15.00	0.4600E+02		150.0
AT	SF7-0231	0.00	15.00	0.0000E+00		0.0
HY	TO-HJ-302H	0.00	0.00	0.0000E+00		0.0
T	TO-232	0.00	0.00	0.0000E+00		0.0
U	CA3045	15.00	15.00	0.5000E+01	LIN	150.0
U	CA3033	12.00	15.00	0.1700E+02	LIN	150.0
U	UA741E	22.00	15.00	0.2300E+02	LIN	150.0
Q	2N3467S	40.00	15.00	0.1000E+01	13	10.0
CR	1N5711	0.00	15.00	0.1000E+01	72	0.0
CR	1N4148	75.00	15.00	0.1000E+01	40	0.0
CR	1N754A	6.80	6.80	0.1000E+01	50	0.0
L	1025-X	750.00	60.00	0.1800E+00	IND	0.0
L	1025-X	750.00	60.00	0.2200E+00	IND	0.0
L	1025-X	750.00	60.00	0.1000E+03	IND	0.0
C	3MCG-C-X	100.00	15.00	0.1000E+00	CK	10.0
C	CM05-X	500.00	0.10	0.4700E-04	CM	10.0
C	CM06-X	500.00	0.50	0.5600E-03	CM	10.0
C	CM05-X	500.00	0.30	0.1000E-03	CM	10.0
C	CM05-X	500.00	0.30	0.2700E-03	CM	10.0
C	3MCG-C-X	100.00	15.00	0.1000E-01	CK	10.0
C	6DP-1-222	500.00	4.00	0.2200E-02	CM	10.0
C	CM05-X	500.00	7.00	0.1500E-04	CM	10.0
C	CSR13-X-S	35.00	15.00	0.6800E+01	CSR	1.5
C	1201-052	0.00	15.00	0.1000E-02		1.0
FE	21-031J	0.00	0.00	0.0000E+00		0.0
R	RC07	0.25	0.10	0.3000E+03	RC	5.0
R	RC07	0.25	0.10	0.1800E+02	RC	5.0
R	RC07	0.25	0.10	0.2400E+05	RC	5.0
R	RC07	0.25	0.10	0.2000E+03	RC	5.0
R	RC07	0.25	0.10	0.1000E+04	RC	5.0
R	RC07	0.25	0.10	0.6200E+03	RC	5.0
R	RC07	0.25	0.10	0.4700E+05	RC	5.0
R	RC07	0.25	0.10	0.1500E+04	RC	5.0
R	RN55D	0.12	0.10	0.6810E+03	RN	1.0
R	RN55D	0.12	0.10	0.2150E+04	RN	1.0
R	RC07	0.25	0.10	0.1600E+04	RC	5.0
R	RC07	0.25	0.10	0.5600E+04	RC	5.0
R	RC07	0.25	0.10	0.1800E+04	RC	5.0
R	RN55D	0.12	0.10	0.1500E+05	RN	1.0
R	RC07	0.25	0.10	0.3900E+05	RC	5.0
R	3299P-1503	0.50	0.10	0.5000E+05	RJ	1.0
R	RC07	0.25	0.10	0.6800E+03	RC	5.0
R	RN55D	0.12	0.10	0.2000E+04	RN	1.0
R	RN55D	0.12	0.10	0.1210E+06	RN	1.0
R	RC07	0.25	0.10	0.1500E+06	RC	5.0
R	RC07	0.25	0.10	0.2700E+05	RC	5.0
R	RC07	0.25	0.10	0.3300E+03	RC	5.0
R	RC07	0.25	0.10	0.6800E+05	RC	5.0
R	RN55D	0.12	0.10	0.3830E+04	RN	5.0
R	RN55D	0.12	0.10	0.4990E+02	RN	5.0
R	RN55D	0.12	0.10	0.9530E+03	RN	5.0

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
R	RN55D	0.12	0.10	0.6040E+04	RN	5.0
R	RN55D	0.12	0.10	0.1620E+05	RN	5.0
R	RN55D	0.12	0.10	0.3400E+05	RN	5.0
R	RN55D	0.12	0.10	0.3240E+05	RN	5.0
R	RN55D	0.12	0.10	0.8660E+04	RN	5.0
C	1201-1	0.12	0.10	0.1000E+05	RN	5.0
		0.00	0.00	0.0000E+00		1.0

PCA AMPLIFIER 212-2-016

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	10.80	0.71984E-02	120	0.73184E+00
R	RN55D	8.36	0.15024E-01	76	0.28346E+01
C	CM05-X	16.80	0.44026E-02	24	0.10566E+00
HY	GPD-402	120.00	0.00000E+00	4	0.00000E+00
HY	UTD-523	1740.00	0.00000E+00	12	0.00000E+00
HY	UTD-505	600.00	0.00000E+00	4	0.00000E+00
AT	SF7-0231	1500.00	0.00000E+00	12	0.00000E+00
HY	TO-HJ-302H	140.00	0.00000E+00	4	0.00000E+00
T	TO-232	100.00	0.00000E+00	4	0.00000E+00
U	CA3045	32.00	0.98895E+00	4	0.39558E+01
U	CA3033	30.00	0.19601E+01	4	0.78402E+01
U	UA741E	10.00	0.23223E+01	4	0.92891E+01
Q	2N3467S	22.00	0.56833E+01	4	0.22733E+02
CR	1N5711	21.00	0.00000E+00	28	0.00000E+00
CR	1N4148	9.00	0.00000E+00	36	0.00000E+00
CR	1N754A	1.20	0.00000E+00	4	0.00000E+00
L	1025-X	25.56	0.00000E+00	36	0.00000E+00
C	3MCG-C-X	35.88	0.84679E-01	52	0.44033E+01
C	CM06-X	2.80	0.44026E-02	4	0.17611E-01
C	6DP-1-222	0.88	0.44027E-02	4	0.17611E-01
C	CSR13-X-S	5.52	0.48629E-01	8	0.38903E+00
C	1201-052	20.00	0.00000E+00	8	0.00000E+00
FE	21-031J	312.00	0.00000E+00	8	0.00000E+00
R	3299P-1503	14.40	0.20576E+01	4	0.82303E+01
C	1201-1	0.00	0.00000E+00	4	0.00000E+00
	TOTALS	4778.20		472	0.60548E+02

RAM ANALYSIS

70 MHZ P. P. FILTER 212-2-026

AMBIENT TEMPERATURE TA = 25. 00 ENVIRONMENT PIE = 1. 00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
R	RL07	0. 25	0. 10	0. 0000E+00	RL	1. 0
C	301-00C0-X	100. 00	0. 10	0. 1000E-05	CK	10. 0
C	301-00C0-X	100. 00	0. 10	0. 3300E-05	CK	10. 0
C	CM05-X	500. 00	0. 10	0. 1800E-03	CM	10. 0
L	558-7106-10	0. 00	0. 10	0. 1200E+01	IND	0. 0
FE	1041-T060-3E2A	0. 00	0. 00	0. 0000E+00		0. 0

70 MHZ P. P. FILTER 212-2-026

	PART NO.	COST	LAMDA P	QTY	GFR
R	RL07	1. 08	0. 75258E-02	12	0. 10837E+00
C	CM05-X	2. 80	0. 44026E-02	4	0. 17611E-01
C	301-0000-X	3. 52	0. 75271E-01	16	0. 12043E+01
L	558-7106-10	6. 32	0. 00000E+00	8	0. 00000E+00
FE	1041-T060-3E2A	3. 92	0. 00000E+00	8	0. 00000E+00
	TOTALS	17. 64		48	0. 13303E+01

RAM ANALYSIS

FORWARD EQUALIZER BUFFER 212-2-028

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
U	SN74S140	7.00	5.00	0.2000E+01	DIG	300.0
R	RC07	0.25	0.10	0.1000E+04	RC	5.0
C	TE-1305.5	50.00	5.00	0.2500E+02	CSR	1.5
C	CW15C-X	50.00	5.00	0.1000E+00	CK	10.0
C	CW15C-X	50.00	5.00	0.1000E-01	CK	10.0
E	DBM-25PF	1000.00	5.00	0.2500E+02		
E	DCM-37PF	1000.00	5.00	0.3700E+02		

FORWARD EQUALIZER BUFFER 212-2-028

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	0.09	0.71984E-02	1	0.59987E-02
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
U	SN74S140	3.60	0.16010E+01	3	0.48031E+01
C	TE-1305.5	2.25	0.22148E-01	1	0.22148E-01
C	CW15C-X	2.72	0.78058E-01	4	0.31223E+00
E	DCM-37PF	11.20	0.21878E+00	1	0.21878E+00
	TOTALS	37.46		11	0.55150E+01

RAM ANALYSIS

PREDETECTION COMBINER LEVEL A 212-2-031

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
U	OP-02EY	22.00	15.00	0.2300E+02	LIN	10.0
U	SN74S132	7.00	5.00	0.4000E+01	DIG	10.0
R	RC07	0.25	0.10	0.1000E+03	RC	5.0
R	RC07	0.25	0.10	0.2000E+03	RC	5.0
R	RC07	0.25	0.10	0.4700E+03	RC	5.0
R	RC07	0.25	0.10	0.6200E+03	RC	5.0
R	RC07	0.25	0.10	0.1000E+04	RC	5.0
R	RC07	0.25	0.10	0.3300E+04	RC	5.0
R	RC07	0.25	0.10	0.4300E+04	RC	5.0
R	RC07	0.25	0.10	0.6200E+04	RC	5.0
R	RC07	0.25	0.10	0.1800E+05	RC	5.0
R	RC07	0.25	0.10	0.3600E+05	RC	5.0
R	RC07	0.25	0.10	0.5600E+05	RC	5.0
R	RC07	0.25	0.10	0.7500E+05	RC	5.0
R	RC07	0.25	0.10	0.1600E+06	RC	5.0
R	3282H	0.50	0.10	0.1000E+04	RJ	2.0
R	3282H	0.50	0.10	0.2000E+05	RJ	2.0
C	TE-1305.5	50.00	15.00	0.2500E+02	CSR	1.5
C	CW15C-X	50.00	15.00	0.1000E+00	CK	10.0
C	CW30A-X	50.00	15.00	0.1000E+01	CK	10.0
C	CW15C-X	50.00	15.00	0.1000E-01	CK	10.0
E	DBM-25PF	1000.00	15.00	0.2500E+02		
E	DBM-37PF	1000.00	15.00	0.3700E+02		

PREDETECTION COMBINER LEVEL A 212-2-031

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	4.23	0.71984E-02	47	0.29814E+00
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
C	TE-1305.5	6.75	0.22148E-01	3	0.93021E-01
C	CW15C-X	10.88	0.78058E-01	16	0.24087E+01
U	OP-02EY	37.50	0.15482E+00	5	0.77409E+00
U	SN74S132	3.60	0.69546E-01	3	0.20864E+00
R	3282H	36.00	0.41152E+01	10	0.41152E+02
C	CW30A-X	3.40	0.15054E+00	5	0.75271E+00
E	DBM-37PF	11.20	0.21878E+00	1	0.21878E+00
	TOTALS	131.16		91	0.46058E+02

RAM ANAI YSIS

TEST CORRELATOR CARD #1 212-2-033

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
U	LM311N	36.00	5.00	0.2400E+02	LIN	150.0
U	AD7513KN	17.00	15.00	0.1000E+02	LIN	300.0
U	UA741T	22.00	15.00	0.2300E+02	LIN	150.0
U	AD532J	18.00	15.00	0.2800E+02	LIN	150.0
U	AD452J	18.00	15.00	0.9200E+02	LIN	300.0
U	SN7400	7.00	5.00	0.4000E+01	DIG	300.0
U	SN7474	7.00	5.00	0.1200E+02	DIG	300.0
U	SN7490	7.00	5.00	0.1500E+02	DIG	300.0
U	SN74393	7.00	5.00	0.1700E+02	DIG	300.0
U	SN75451	7.00	5.00	0.1000E+02	DIG	300.0
R	3282H	0.50	0.10	0.1000E+05	RJ	2.0
R	3282H	0.50	0.10	0.2000E+05	RJ	2.0
R	3282H	0.50	0.10	0.5000E+05	RJ	2.0
R	RC07	0.25	0.10	0.2000E+03	RC	5.0
R	RC07	0.25	0.10	0.1000E+04	RC	5.0
R	RC07	0.25	0.10	0.2700E+04	RC	5.0
R	RC07	0.25	0.10	0.7500E+04	RC	5.0
R	RC07	0.25	0.10	0.1000E+05	RC	5.0
R	RC07	0.25	0.10	0.1500E+05	RC	5.0
R	RC07	0.25	0.10	0.1800E+05	RC	5.0
R	RC07	0.25	0.10	0.2000E+05	RC	5.0
R	RC07	0.25	0.10	0.3000E+05	RC	5.0
C	CY20C-X	50.00	15.00	0.4700E+00	CK	10.0
C	CY15C-X	50.00	5.00	0.2500E-01	CK	10.0
E	DBM-25PF	1000.00	15.00	0.2500E+02		
E	DCM-25PF	1000.00	15.00	0.2500E+02		

TEST CORRELATOR CARD #1 212-2-033

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	1.80	0.71984E-02	20	0.11997E+00
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
R	3282H	28.80	0.41152E+01	8	0.32921E+02
U	LM311N	2.50	0.23784E+01	1	0.23784E+01
U	AD7513KN	22.00	0.29126E+01	1	0.29126E+01
U	UA741T	4.23	0.23223E+01	3	0.69668E+01
U	AD532J	51.00	0.25936E+01	3	0.77807E+01
U	AD452J	42.00	0.11091E+02	3	0.33274E+02
U	SN7400	1.41	0.20864E+01	3	0.62591E+01
U	SN7474	1.44	0.31986E+01	2	0.63972E+01
U	SN7490	2.28	0.34933E+01	3	0.10480E+02
U	SN74393	4.24	0.36712E+01	2	0.73424E+01
U	SN75451	2.40	0.29774E+01	1	0.29774E+01
C	CY20C-X	2.44	0.15054E+00	4	0.60216E+00
C	CY15C-X	0.61	0.78058E-01	1	0.78058E-01
E	DCM-25PF	17.60	0.15268E+00	1	0.15268E+00
	TOTALS	202.35		57	0.12080E+03

RAM ANALYSIS

TEST CORRELATOR CARD #2 212-2-035

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
U	SN7400	7.00	5.00	0.4000E+01	DIG	300.0
U	SN74LS47	7.00	5.00	0.4400E+02	DIG	300.0
U	SN74LS83	7.00	5.00	0.4200E+02	DIG	300.0
U	SN7490	7.00	5.00	0.1500E+02	DIG	300.0
U	SN74151	7.00	5.00	0.1700E+02	DIG	300.0
U	SN74185	7.00	5.00	0.2560E+03	ROM	300.0
U	SN74393	7.00	5.00	0.1700E+02	DIG	300.0
U	AD452J	18.00	15.00	0.0000E+00	LIN	300.0
R	RC07	0.25	0.10	0.2000E+03	RC	5.0
R	RC07	0.25	0.10	0.1000E+04	RC	5.0
R	RC07	0.25	0.10	0.5100E+04	RC	5.0
R	3282H	0.50	0.10	0.5000E+05	RJ	2.0
E	DBM-25PF	1000.00	15.00	0.2500E+02		
E	DCM-37PF	1000.00	15.00	0.3700E+02		

TEST CORRELATOR CARD #2 212-2-035

	PART NO.	COST	LAMDA P	QTY	GFR
R	RC07	2.07	0.71984E-02	23	0.13797E+00
E	DBM-25PF	17.60	0.15268E+00	1	0.15268E+00
E	DCM-37PF	11.20	0.21878E+00	1	0.21878E+00
R	3282H	7.20	0.41152E+01	2	0.82303E+01
U	AD452J	28.00	0.11091E+02	2	0.00000E+00
U	SN7400	0.94	0.20864E+01	2	0.41728E+01
U	SN7490	1.52	0.34933E+01	2	0.69867E+01
U	SN74393	31.80	0.36712E+01	15	0.55068E+02
U	SN74LS47	2.16	0.62823E+01	3	0.18847E+02
U	SN74LS83	1.56	0.61531E+01	2	0.12306E+02
U	SN74151	8.28	0.36712E+01	9	0.33041E+02
U	SN74185	2.76	0.17040E+01	3	0.51121E+01
	TOTALS	115.09		65	0.14427E+03

RAM ANALYSIS

POWER SUPPLY SUBSYSTEM 212-2-037

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
PS	B15GT75	0.00	120.00	0.1125E+02		0.0
PS	VRB5GT210	0.00	120.00	0.1050E-01		0.0
PS	RB15GT420	0.00	120.00	0.5700E-01		0.0
PS	B24GT75	0.00	120.00	0.1800E+02		0.0
FL	3R1	0.00	120.00	0.0000E+00		0.0
S	JBT-100220	0.00	120.00	0.0000E+00		0.0
E	7555	0.00	120.00	0.2000E+01		
E	7556	0.00	120.00	0.2000E+01		
F	HCM	250.00	120.00	0.0000E+00		0.0
E	26-4401-16S	1000.00	24.00	0.0000E+00		
DS	4538-1531-610	0.00	120.00	0.0000E+00	0	0.0

POWER SUPPLY SUBSYSTEM 212-2-037

	PART NO.	COST	LAMDA P	QTY	GFR
PS	B15GT75	85.00	0.00000E+00	1	0.00000E+00
PS	VRB5GT210	135.00	0.00000E+00	1	0.00000E+00
PS	RB15GT420	155.00	0.00000E+00	1	0.00000E+00
PS	B24GT75	80.00	0.00000E+00	1	0.00000E+00
FL	3R1	13.00	0.10000E+00	1	0.10000E+00
S	JBT-100220	3.95	0.00000E+00	1	0.00000E+00
E	7555	7.50	0.43521E-01	1	0.43521E-01
E	7556	7.50	0.43521E-01	1	0.43521E-01
F	HCM	0.40	0.00000E+00	1	0.00000E+00
E	26-4401-16S	17.20	0.00000E+00	1	0.00000E+00
DS	4538-1531-610	0.32	0.20000E+00	1	0.20000E+00
	TOTALS	504.87		11	0.38704E+00

RAM ANALYSIS

CARD TO BACKPLANE CONNECTORS 212-2-038

AMBIENT TEMPERATURE TA = 25.00 ENVIRONMENT PIE = 1.00

REFN	PART NO.	RATED	APPLD	VALUE	TYPE	PIQ
E	DBR-25S-F179A	1000.00	24.00	0.2500E+02		
E	DCR-37S-F179A	1000.00	10.00	0.3700E+02		
E	DM-53742-5001	750.00	3.00	0.1000E+01		
E	OSM-531-3	750.00	3.00	0.1000E+01		
E	2923-6001	750.00	0.20	0.1000E+01		

CARD TO BACKPLANE CONNECTORS 212-2-038

	PART NO.	COST	LAMDA P	QTY	GFR
E	OSM-531-3	18.00	0.31966E-01	4	0.12786E+00
E	DBR-25S-F179A	0.00	0.15268E+00	26	0.39698E+01
E	DCR-37S-F179A	0.00	0.21878E+00	3	0.65635E+00
E	DM-53742-5001	0.00	0.31966E-01	90	0.28769E+01
E	2923-6001	0.00	0.31966E-01	4	0.12786E+00
	TOTALS	18.00		127	0.77588E+01

TOTALS

	PART NO.	COST	LAMDA P	QTY	GFR
U	AD518S/883	430.80	0.37083E+01	24	0.88998E+02
U	RB741T	105.60	0.23223E+01	48	0.11147E+03
U	AH-4013	420.00	0.37083E+01	3	0.11125E+02
U	AH-52	300.00	0.37083E+01	5	0.18541E+02
U	AHD-555	70.00	0.37083E+01	2	0.74165E+01
U	GPD-403	30.00	0.37083E+01	1	0.37083E+01
U	SN74S03	13.68	0.20864E+01	3	0.62591E+01
U	SN74S74	21.93	0.31986E+01	3	0.95958E+01
U	SN74S04	5.41	0.24398E+01	1	0.24398E+01
U	CA3045	32.00	0.98895E+00	4	0.39558E+01
U	CA3033	30.00	0.19601E+01	4	0.78402E+01
U	UA741E	10.00	0.23223E+01	4	0.92891E+01
U	SN74S140	3.60	0.16010E+01	3	0.48031E+01
U	OP-02EY	37.50	0.15482E+00	5	0.77409E+00
U	SN74S132	3.60	0.69546E-01	3	0.20864E+00
U	LM311N	2.50	0.23784E+01	1	0.23784E+01
U	AD7513KN	22.00	0.29126E+01	1	0.29126E+01
U	UA741T	4.23	0.23223E+01	3	0.69668E+01
U	AD532J	51.00	0.25936E+01	3	0.77807E+01
U	AD452J	70.00	0.11091E+02	5	0.33274E+02
U	SN7400	2.35	0.20864E+01	5	0.10432E+02
U	SN7474	1.44	0.31986E+01	2	0.63972E+01
U	SN7490	3.80	0.34933E+01	5	0.17467E+02
U	SN74393	36.04	0.36712E+01	17	0.62411E+02
U	SN75451	2.40	0.29774E+01	1	0.29774E+01
U	SN74LS47	2.16	0.62823E+01	3	0.18847E+02
U	SN74LS83	1.56	0.61531E+01	2	0.12306E+02
U	SN74151	8.28	0.36712E+01	9	0.33041E+02
U	SN74185	2.76	0.17040E+01	3	0.51121E+01
Q	2N3467S	22.00	0.56833E+01	4	0.22733E+02
R	RC07	27.27	0.71984E-02	303	0.19082E+01
R	RL07	26.46	0.75258E-02	294	0.23811E+01
R	RJ24FP-X	120.00	0.41152E+01	48	0.19753E+03
R	RN55	36.96	0.12520E-01	336	0.42970E+01
R	RJ24CP-X	2.64	0.53497E+01	24	0.12839E+03
R	RN55D	8.69	0.15024E-01	79	0.28797E+01
R	3299P-1503	14.40	0.20576E+01	4	0.82303E+01
R	3282H	72.00	0.41152E+01	20	0.82303E+02
C	JMC-9321	52.65	0.15390E+00	27	0.41554E+01
C	CM05F-X	12.00	0.44026E-02	24	0.10566E+00
C	CM06F-X	12.00	0.44026E-02	24	0.10566E+00
C	CK06BX-X	152.60	0.84679E-01	218	0.19217E+02
C	TRWX440	40.32	0.29845E-02	24	0.71627E-01
C	401EC0050AD-X	360.00	0.32452E-01	48	0.15577E+01
C	CM05C-X	12.00	0.44026E-02	24	0.10566E+00
C	CSR13F-X-S	10.56	0.48629E-01	24	0.11671E+01
C	CK05BX-X	22.00	0.75619E-01	44	0.34166E+01
C	CSR13F-X-M	5.00	0.13167E+00	5	0.65835E+00
C	CSR13F-X-R	6.00	0.13167E+00	6	0.79002E+00
C	CM05-X	21.70	0.44026E-02	31	0.13648E+00
C	JMC-9322	2.10	0.76952E-02	3	0.23086E-01
C	CSR13G-X-M	1.95	0.64399E-01	1	0.64399E-01
C	3MCG-C-X	35.88	0.84679E-01	52	0.44033E+01
C	CM06-X	2.80	0.44026E-02	4	0.17611E-01
C	6DP-1-222	0.88	0.44027E-02	4	0.17611E-01
C	CSR13-X-S	5.52	0.48629E-01	8	0.38903E+00

TOTALS - CONT.

	PART NO.	COST	LAMDA P	QTY	GFR
C	1201-052	20.00	0.00000E+00	8	0.00000E+00
C	1201-1	0.00	0.00000E+00	4	0.00000E+00
C	301-00C0-X	3.52	0.75271E-01	16	0.12043E+01
C	TE-1305.5	9.00	0.22148E-01	4	0.11517E+00
C	CW15C-X	13.60	0.78058E-01	20	0.27209E+01
C	CW30A-X	3.40	0.15054E+00	5	0.75271E+00
C	CY20C-X	2.44	0.15054E+00	4	0.60216E+00
C	CY15C-X	0.61	0.78058E-01	1	0.78058E-01
E	700303	90.00	0.31966E-01	12	0.38359E+00
E	700056	105.00	0.31966E-01	14	0.44753E+00
E	DM-53740-5001	776.10	0.31966E-01	65	0.20778E+01
E	DBM-25PF	334.40	0.15268E+00	19	0.29010E+01
E	819-B3800-B-75	45.00	0.31966E-01	12	0.38359E+00
E	OSM-511-3	135.00	0.31966E-01	30	0.95898E+00
E	7000310	60.00	0.31966E-01	8	0.25573E+00
E	OSM-531-3	27.00	0.31966E-01	6	0.19180E+00
E	DCM-37PF	22.40	0.21878E+00	2	0.43757E+00
E	DBM-37PF	11.20	0.21878E+00	1	0.21878E+00
E	DCM-25PF	17.60	0.15268E+00	1	0.15268E+00
E	7555	7.50	0.43521E-01	1	0.43521E-01
E	7556	7.50	0.43521E-01	1	0.43521E-01
E	26-4401-16S	17.20	0.00000E+00	1	0.00000E+00
E	DBR-25S-F179A	0.00	0.15268E+00	26	0.39698E+01
E	DCR-37S-F179A	0.00	0.21878E+00	3	0.65635E+00
E	DM-53742-5001	0.00	0.31966E-01	90	0.28769E+01
E	2923-6001	0.00	0.31966E-01	4	0.12786E+00
L	B-X-P	34.08	0.00000E+00	48	0.00000E+00
L	WEE-X	40.74	0.00000E+00	21	0.00000E+00
L	1025-X	25.56	0.00000E+00	36	0.00000E+00
L	558-7106-10	6.32	0.00000E+00	8	0.00000E+00
CR	A5X671	141.60	0.00000E+00	48	0.00000E+00
CR	1N759A	0.70	0.00000E+00	1	0.00000E+00
CR	1N5711	21.00	0.00000E+00	28	0.00000E+00
CR	1N4148	9.00	0.00000E+00	36	0.00000E+00
CR	1N754A	1.20	0.00000E+00	4	0.00000E+00
HY	FP-J4-100-70	840.00	0.10000E-01	24	0.24000E+00
HY	TO-HJ-302SP	210.00	0.10000E-01	15	0.15000E+00
HY	CSB-100P	240.00	0.10000E-01	12	0.12000E+00
HY	TO-HC-127	336.00	0.10000E-01	24	0.24000E+00
HY	OHJ-3044	282.00	0.10000E-01	6	0.60000E-01
HY	R-HJ-304	39.00	0.10000E-01	1	0.10000E-01
HY	R-HJ-303L	88.00	0.10000E-01	2	0.20000E-01
HY	767	105.00	0.10000E-01	6	0.60000E-01
HY	TO-J4-70	105.00	0.10000E-01	3	0.30000E-01
HY	GPD-402	120.00	0.00000E+00	4	0.00000E+00
HY	UTO-523	1740.00	0.00000E+00	12	0.00000E+00
HY	UTO-505	600.00	0.00000E+00	4	0.00000E+00
HY	TO-HJ-302H	140.00	0.00000E+00	4	0.00000E+00
M	17446	40.00	0.10000E+02	1	0.10000E+02
S	PA-1015	5.69	0.00000E+00	1	0.00000E+00
S	PA-1005	5.69	0.00000E+00	1	0.00000E+00
S	MPG-106F	2.50	0.00000E+00	1	0.00000E+00
S	JBT-100220	3.95	0.00000E+00	1	0.00000E+00
DS	5082-4955	1.00	0.20000E+00	1	0.20000E+00
DS	5082-4650	2.00	0.20000E+00	2	0.40000E+00
DS	4538-1531-610	0.32	0.20000E+00	1	0.20000E+00

TOTALS - CONT.

	PART NO.	COST	LAMDA P	QTY	GFR
DL	MCT-1000	1098.00	0.00000E+00	1	0.00000E+00
AT	SF7-0231	1500.00	0.00000E+00	12	0.00000E+00
T	TO-232	100.00	0.00000E+00	4	0.00000E+00
FE	21-031J	312.00	0.00000E+00	8	0.00000E+00
FE	1041-T060-3E2A	3.92	0.00000E+00	8	0.00000E+00
PS	B15GT75	85.00	0.00000E+00	1	0.00000E+00
PS	VRB5GT210	135.00	0.00000E+00	1	0.00000E+00
PS	RB15GT420	155.00	0.00000E+00	1	0.00000E+00
PS	B24GT75	80.00	0.00000E+00	1	0.00000E+00
FL	3R1	13.00	0.10000E+00	1	0.10000E+00
F	HCM	0.40	0.00000E+00	1	0.00000E+00
	TOTALS	13188.16		2609	0.10292E+04